

# Strategic regional water resource solutions: detailed feasibility and concept design

## Standard gate two submission for Grand Union Canal Transfer SRO

Date: 22 December 2022



This document has been written in line with the requirements of the RAPID gate two guidance and to comply with the regulatory process pursuant to Severn Trent Water's and Affinity Water's statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solution presented in this document be taken forward, Severn Trent Water and Affinity Water will be subject to the statutory duties pursuant to the necessary consenting process, including environmental assessment and consultation as required. This document should be read with those duties in mind.

Revision History

Revision Ref/Date	Amendments	Issued
13 <sup>th</sup> November 2022	Submission Document	RAPID
21 <sup>st</sup> December 2022	NPV revision in tables 8.1, 8.2, 8.3, 8.4 and 8.5 following a change in methodology for the application of Optimism Bias (OB) when calculating the NPV.	Republish on solution owners' websites

Attention: Mr Paul Hickey  
Managing Director  
Regulators' Alliance for Progressing Infrastructure Development  
Ofwat  
City Centre Tower  
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14 November 2022

### **Grand Union Canal (GUC) SRO Gate 2 Submission**

Dear Paul

Affinity Water, Severn Trent Water and the Canal & River Trust are pleased to submit our gate-2 report for the GUC Transfer Strategic Resources Option (SRO). The report outlines how we have developed this SRO since its approval at gate-1, and the key steps we intend to take in gate-3.

Through this SRO and our proposals for the Minworth SRO, we intend to transfer water from Minworth wastewater treatment works to the Grand Union Canal and into the Affinity Water supply area, supporting customers in the South East of England with up to 100MI/d of water in times of need. We can provide 50MI/d into supply in 2031 in line with the draft Water Resource Management Plans in August 2022.


As recommended in our gate-1 submission, we are proposing to upgrade the Grand Union Canal for the transfer, and to abstract, store and treat the water downstream before it enters Affinity Water's supply area. Utilising existing canal infrastructure will allow us to provide value for money and to enhance the recreational value of the canal for local people.

Our cross-industry team, including personnel from Affinity Water, Severn Trent Water and the Canal & River Trust, has been delighted to make this contribution to strengthening the UK's water infrastructure and creating a legacy of resilient water resources for future generations.

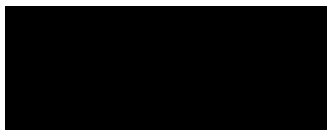
The Boards of Affinity Water and Severn Trent Water confirm their support for this SRO with the supporting board statement attached. We have also included a separate statement from the Canal & River Trust.

We have aimed to create a gate-2 report that meets RAPID's requirements at this stage in the process. If there are elements you would like to discuss with the team, please send your queries to [wrmocomms@affinitywater.co.uk](mailto:wrmocomms@affinitywater.co.uk), [justin.bailey@severntrent.co.uk](mailto:justin.bailey@severntrent.co.uk) and [GUC@severntrent.co.uk](mailto:GUC@severntrent.co.uk); we would welcome the opportunity to provide further clarity where needed. We have received a letter of support from the Environment Agency, which can be provided on request. We look forward to receiving your feedback, and to developing this SRO into gate-3.

Yours sincerely



Ian Tyler  
Chair Affinity Water



Liv Garfield  
Chief Executive Severn Trent

Author signatures redacted

## Gate 2: Detailed feasibility, concept design and multi-solution decision making

### Grand Union Canal Strategic Resource Option Joint Board Assurance Statement

This joint board assurance statement is provided by the Grand Union Canal partners, Severn Trent Water and Affinity Water. The two companies, together with the Canal & River Trust, have worked effectively and collaboratively on the Gate 2 solution development. In support of this statement the two companies have undertaken both joint and individual company assurance and due diligence.

Each of the boards are satisfied that the data and approaches used to develop the concept design and decision-making information included within the Gate 2 submission:

- meets the requirements set out in Ofwat's Final Determination, and subsequent additional feedback from Ofwat;
- have been subject to sufficient processes and internal systems of control to ensure that the information on design, costs and benefits contained in this submission are reliable;
- have been appropriately assured to give our stakeholders, including customers, trust and confidence in this gate two submission; and
- have appropriately considered the feedback and opinion of independent external assurance partners.

The Severn Trent Water Board confirm that they understand their role in this submission as suppliers of the water. Affinity Water confirms that they understand their role in this submission as a recipient of the water.

The Boards all support the recommendation for the solution progression made in this submission and are satisfied that the:

- support the recommendation for the solution progression made in this submission and the recommendations for which options with the solution should be progressed;
- are satisfied that progress on the solution is commensurate with the solution being "construction-ready" for 2025-2030
- are satisfied that the work carried out to date is of sufficient scope, detail and quality as would be expected of a large infrastructure scheme of this nature at this stage.
- are satisfied that expenditure has been incurred on activities that are appropriate for gate two and is efficient.

**On Behalf of:**

**Name and position:**

**Date:**

**Signature:**

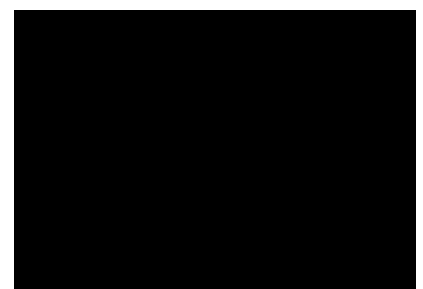
Severn Trent Water

John Coghlan  
Independent Non-Executive  
Director and Chair of the  
Audit and Risk Committee

14 November 2022

Affinity Water

14 November 2022



Author signatures redacted

## Board Assurance

The following table provides details the main factors the Boards have taken into account in support this joint Board Assurance Statement.

Statements	Considerations
<p>It <b>supports the recommendations</b> for solution progression made in this submission and the recommendations for which options with the solution should be progressed.</p>	<p>The recommendations and methodology regarding scheme progress for the solution have been agreed by the scheme partners and discussed with RAPID.</p> <p>The Executive Programme Board and Board reviewed and discussed the conclusions and approved the recommendations for the solution.</p> <p>Independent external assurance was completed on behalf of the SRO with findings reported to the Board.</p>
<p>It is satisfied that progress on solution is commensurate with the solution being "<b>construction-ready</b>" for 2025-2030</p>	<p>The Executive Programme Board reviewed the project plan and the sources of data used to carry out the assessment</p> <p>The project plan showing when the solution will be construction ready is in place and has been reported to the Board</p> <p>Independent external assurance was completed on behalf of the SRO with findings reported to the Board.</p>
<p>It is satisfied that the <b>work carried out to date</b> is of sufficient scope, detail and quality as would be expected of a large infrastructure scheme of this nature at this stage.</p>	<p>Technical teams drafted Concept Design Reports and the key findings which were reviewed and approved by the Executive Programme Board</p> <p>Peer review of documents focused on scope, detail and quality was completed with findings reported to the Executive Programme Board</p> <p>Independent external assurance was completed on behalf of the SRO with findings reported to the Board.</p>
<p>The Board is satisfied that <b>expenditure</b> has been incurred on activities that are appropriate for gate two and <b>is efficient</b>.</p>	<p>A review on activity expenditure has been shared and reviewed at Executive Programme Board with key findings reported to the Board.</p> <p>A separate document providing evidence of efficient cost expenditure was drafted and approved by finance teams and reported to the Board.</p> <p>Independent external assurance was completed on behalf of the SRO with findings reported to the Board.</p>

## **Gate 2: Detailed feasibility, concept design and multi-solution decision making**

### **Grand Union Canal Strategic Resource Option Canal & River Trust – Statement of Support**

This statement of support is provided by the Canal & River Trust (the Trust) who have been working in partnership on the development of the Grand Union Canal Strategic Resource Option. The Trust, together with Affinity Water and Severn Trent Water have worked effectively and collaboratively on the gate two concept design assessment.

The Trust can play a significant role supporting the water sector as it strives for resilience and affordability in delivering public water supply. Our waterway infrastructure already exists and with investment from the sector could unlock resilient and cost-effective water transfer schemes across England and Wales.

The Trust confirm that they understand their role in this submission as the conveyor of the source water from Severn Trent Water, transferring it to Affinity Water, for abstraction as the recipient. The Trust will continue to support the development of this Strategic Resource Option provided it remains cost effective for all parties involved and the Trust's statutory obligations and responsibilities remain unaffected.

The Trust supports the recommendation for the solution progression made in this submission and are satisfied that the:

- scope, detail and quality of the preliminary activities are that which would be expected of a large infrastructure scheme of this nature at this stage;
- development of the Grand Union Canal as a strategic transfer route, is a sensible and efficient use of existing infrastructure.

**On Behalf of:**

**Name and position:**

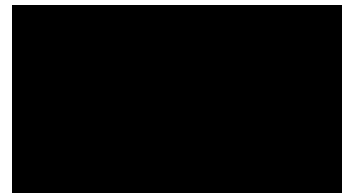
**Date:**

**Signature:**

Canal & River Trust

Stuart Mills, Chief  
Investment Officer

31 October 2022



## Glossary

Abbreviation	Explanation	Abbreviation	Explanation
<b>ACWG</b>	All Company Working Group	<b>NPV</b>	Net Present Value
<b>ADO</b>	Average Deployable Output	<b>NSIP</b>	Nationally Significant Infrastructure Project
<b>AfW</b>	Affinity Water	<b>O&amp;M</b>	Operations & Maintenance
<b>AIC</b>	Average Incremental Costs	<b>OB</b>	Optimism Bias
<b>BAU</b>	Business As Usual	<b>OPEX</b>	Operating Expenditure
<b>BNG</b>	Biodiversity Net Gain	<b>PAS</b>	Publicly Available Specification
<b>BSA</b>	Bulk Supply Agreement	<b>PEIR</b>	Preliminary Environmental Information Report
<b>CAP</b>	Competitively Appointed Provider	<b>PFOA</b>	Perfluorooctanoic Acid
<b>CAPEX</b>	Capital Expenditure	<b>PFOS</b>	Perfluorooctane Sulfonate
<b>CCG</b>	Customer Challenge Group	<b>PQQ</b>	Pre-Qualification Questionnaire
<b>CCW</b>	Consumer Council for Water	<b>PR24</b>	2024 Price Review
<b>CDR</b>	Conceptual Design Report	<b>PRoW</b>	Public Rights of Way
<b>CPO</b>	Compulsory Purchase Order	<b>RAPID</b>	Regulators' Alliance for Progressing Infrastructure Development
<b>CPRE</b>	Campaign to Protect Rural England	<b>RO</b>	Reverse Osmosis
<b>CTC</b>	Cotswold Canals Trust	<b>RSPB</b>	Royal Society for the Protection of Birds
<b>D&amp;B</b>	Design & Build	<b>s.35</b>	Section 35 of the Planning Act 2008
<b>DBFOM</b>	Design, Build, Finance, Operate & Maintain	<b>SAC</b>	Special Area of Conservation
<b>DBOM</b>	Design, Build, Operate and Maintain	<b>SCADA</b>	Supervisory Control and Data Acquisition
<b>DCO</b>	Development Consent Order	<b>SCL</b>	Special Category Land
<b>DO</b>	Deployable Output	<b>SEA</b>	Strategic Environmental Assessment
<b>DPC</b>	Direct Procurement for Customers	<b>SECR</b>	Streamlined Energy and Carbon Reporting
<b>DWI</b>	Drinking Water Inspectorate	<b>SIPR</b>	Specified Infrastructure Projects Regulations
<b>DWPA</b>	Drinking Water Protected Area	<b>SLR</b>	South Lincolnshire Reservoir
<b>DWSP</b>	Drinking Water Safety Plan	<b>SOC</b>	Strategic Outline Case
<b>EA</b>	Environment Agency	<b>SoCC</b>	Statement of Community Consultation
<b>EAR</b>	Environmental Appraisal Report	<b>SoS</b>	Secretary of State
<b>EIA</b>	Environmental Impact Assessment	<b>SPA</b>	Special Protection Area
<b>ENG</b>	Environmental Net Gain	<b>SPP</b>	Special Parliamentary Procedure
<b>ES</b>	Environmental Statement	<b>SR</b>	Service Reservoir
<b>ESOS</b>	Energy Saving Opportunity Scheme	<b>SRO</b>	Strategic Resource Option
<b>FD</b>	Final Determination	<b>SSSI</b>	Site of Special Scientific Interest
<b>FRA</b>	Flood Risk Assessment	<b>STS</b>	Severn Trent Sources
<b>GLNP</b>	Gloucestershire Local Nature Partnership	<b>STT</b>	Severn to Thames Transfer
<b>GHG</b>	Greenhouse Gas	<b>STW</b>	Severn Trent Water
<b>GUC</b>	Grand Union Canal	<b>SuDS</b>	Sustainable Drainage Systems
<b>GWT</b>	Gloucestershire Wildlife Trust	<b>SVP</b>	Stroud Valley Projects
<b>HE</b>	Historic England	<b>SWQRA</b>	Strategic Water Quality Risk Assessment
<b>HoF</b>	Hands-off Flow	<b>tCO<sub>2</sub>e</b>	tonnes CO <sub>2</sub> equivalent
<b>HRA</b>	Habitats Regulations Assessment	<b>TCPA</b>	Town and Country Planning Act 1990
<b>INNS</b>	Invasive Non-Native Species	<b>The Trust</b>	The Canal & River Trust
<b>ITT</b>	Invitation to Tender	<b>TTT</b>	Thames Tideway Tunnel
<b>LCWIP</b>	Local Cycling and Walking and Infrastructure Plan	<b>WBS</b>	Work Breakdown Structure
<b>M&amp;E</b>	Mechanical & Engineering	<b>WFD</b>	Water Framework Directive
<b>M/d</b>	Megalitres per day	<b>WIA</b>	Water Industry Act
<b>MRS</b>	Market Research Society	<b>WRMP</b>	Water Resources Management Plan
<b>NAU</b>	National Appraisal Unit	<b>WRSE</b>	Water Resources South East
<b>NE</b>	Natural England	<b>WRW</b>	Water Resources West
<b>NFU</b>	National Farmers' Union	<b>WRZ</b>	Water Resource Zone
<b>NGO</b>	Non-Governmental Organisation	<b>WTW</b>	Water Treatment Works
<b>NIC</b>	National Infrastructure Commission	<b>WwTW</b>	Wastewater Treatment Works
<b>NPS</b>	National Policy Statement		

## Contents

1. Executive summary .....	1
2. Background and objectives .....	5
3. Solution design, options and sub-options .....	6
4. Water Resource Assessment .....	10
5. Drinking water quality considerations .....	15
6. Environmental assessment .....	15
7. Programme and planning .....	23
8. Solution costs and benefits .....	42
9. Stakeholder and customer engagement .....	46
10. Board statement and assurance .....	51
11. Efficiency of expenditure for gate two and forecast .....	53
12. Conclusions and recommendations .....	57
13. Supporting documentation .....	60



# 1. Executive Summary

## Opening Statement

- 1.1. The Grand Union Canal (GUC) Transfer Strategic Resource Option (SRO) is a viable solution that transfers surplus water from Severn Trent Water's (STW) supply area to areas of water deficit in Affinity Water's (AfW) supply area. A new pipeline and existing canal will be utilised to convey a source of raw water from the Minworth SRO to the GUC SRO. In the southern section of the GUC, water will be abstracted from the canal at Leighton Buzzard and treated – utilising a multiple-barrier approach and final conditioning – prior to distribution to AfW customers (refer to Figure 3-2).
- 1.2. In accordance with the draft Water Resources South East (WRSE) Regional Plan published in Autumn 2022, a scheme deployable output (DO) of 50 Megalitres per day (Ml/d) is required in 2031/32, with a potential requirement for a further 50 Ml/d by 2040 to 2050.
- 1.3. To account for treatment process losses and AfW's limited treated water storage facilities, a capacity of 57 Ml/d is required to provide an average deployable output (ADO) benefit of 50 Ml/d to AfW. The scheme will convey a year-round operational minimum turnover flow of 14 Ml/d.
- 1.4. The Regulators' Alliance for Progressing Infrastructure Development (RAPID) gated process has allowed this SRO to develop at pace, making significant progress since investigations began in April 2020.
- 1.5. Through gate two, we have established that GUC SRO offers drought resilience to AfW customers and to the GUC by utilising enhanced treated wastewater. We have not discovered any showstoppers, and therefore recommend this SRO proceeds to gate three.
- 1.6. Environmental data on the canal network at the point of starting this project was not readily available. As part of our efficient and relevant spend, we have utilised 42% of our budget to fill this gap in ecological and water quality monitoring by collecting and assessing detailed environmental data since Spring 2020.
- 1.7. Minworth SRO will be the source of raw water to support the new abstraction for the GUC SRO. The Minworth SRO is reported separately in its own gate two submission.

## Key Facts

- 1.8. In the northern section of the scheme, water from Minworth Wastewater Treatment Works (WwTW) will have received enhanced treatment and been transferred to the canal as part of Minworth SRO. Three transfer route options were shortlisted in gate one, and we have now identified the preferred option: transferring flow via a new pipeline over a distance of approximately 20km to a discharge point into the Coventry Canal.
- 1.9. In the southern section of the scheme, three locations for abstraction and treatment facilities were shortlisted. During gate two, a preferred option has been selected at Leighton Buzzard. The selection of the route option and site for abstraction and treatment were based on a set of criteria including engineering and design, construction risk, environmental and societal impacts, cost, and programme and wider benefits. The decision to select this site was supported through engagement

with the Environment Agency (EA) to avoid interaction with chalk streams downstream of Tring. The site at Leighton Buzzard also provides good access to the preferred connection point within AfW’s existing water infrastructure.

- 1.10. In the middle section, the existing canal network owned by the Canal & River Trust (the Trust) provides a water transfer conduit to AfW’s supply area. The majority of the flow along the canal will be by gravity; however, seven pumping stations will be required to bypass “uphill” locks along the route, as well as eight by-passes to “downflow” lock flights.
- 1.11. During gate two, topographical and hydraulic data were gathered through field surveys and incorporated into the hydrological and hydraulic models. The models will be used to refine the engineering design and mitigate constraints on the transfer.
- 1.12. It is predicted that the transfer will lead to small increases in velocity and the requirement to increase canal bank and towpath levels at certain locations. Canal banks will need to be raised where the predicted water level increase is greater than 50mm. The water level increase will be greatest at the upstream end of long pounds (sections of the canal between locks), up to a maximum of 250mm, reducing towards zero at downstream ends.
- 1.13. Velocity increases will be greater in the northern sections of the GUC, compared to the southern section where the canal tends to be wider and deeper. Table 1.1 gives maximum and minimum increases.

Table 1.1: Water level increases and forecast mean velocities

Scheme (Ml/d)	Length of canal (km) <sup>1</sup> with water level increase >50mm	Maximum mean average canal velocity along route (m/s)	Minimum mean average canal velocity along route (m/s)
<b>Current situation<sup>2</sup></b>	0.0	0.008	0.002
<b>57</b>	4.5	0.090	0.024
<b>115</b>	55.3	0.180	0.047

- 1.14. The velocities given above are averages and will change along the route. At narrow points along the canal, such as where certain bridges are located, velocities will be greater. Bypass pipes or other suitable arrangements will be installed where required to reduce velocities. The forecast velocity increases represent acceptable operating conditions and are in line with the Trust’s design and operating standards.
- 1.15. Customer and stakeholder consultations have indicated that the transfer of water via river or canal is more appealing than pipeline options because they are considered to have wider benefits and fewer negative impacts.

## Key Risks

### Key Technical Risks

- 1.16. There is uncertainty around setting the requirement for the level of additional treatment at Minworth WwTW to facilitate a discharge into the canal, with resulting cost uncertainty. This is a Minworth SRO risk and is discussed in detail in the Minworth

<sup>1</sup> The total canal route length from Atherstone to Leighton Buzzard is approximately 131km.

<sup>2</sup> Based on area affected by pumping in the canal to accommodate times of significant boat movement.

SRO gate two submission. Minworth SRO is working closely with the EA to resolve this uncertainty.

- 1.17. There is potential for increased movement of Invasive Non-Native Species (INNS) from the northern section of the canal, due to increased flow. We are monitoring to understand the current prevalence of INNS, and carrying out a pathway-based risk assessment. The findings from this work will be used in gate three to propose ways of reducing the potential for INNS movement.
- 1.18. Initially, we assumed there was potential for the increased flow in the GUC to cause mobilisation and transport of sediment from the base of the canal. Investigations in gate two have concluded that water velocity increases during scheme operation will be insufficient to mobilise bed-level sediment. During gate three, we will carry out further investigation into the chemical content of weak uppermost deposits and their potential for mobilisation.

## Key Delivery Risks

- 1.19. Engagement with Natural England (NE), a key stakeholder, has been reduced due to the organisation's resource limitations. We are working closely with the National Appraisal Unit (NAU) to escalate this for resolution.
- 1.20. In gate three, we will develop the scheme's design to allow environmental specialists to further understand the implications of the development, and complete the data collection needed to complete an Environmental Impact Assessment (EIA).
- 1.21. Wastewater from Minworth WwTW currently discharges to the River Tame and, in the event of a drought reducing river flow, this may result in a restriction to the flow available for the GUC. A number of options for mitigation are being considered, including the provision of water storage to supplement flow. Options considered so far include existing storage assets owned by the Trust, existing reservoirs (requiring expansion) owned by STW, and conversion of third-party assets into storage facilities. This work is being carried out under the Minworth SRO and will be concluded in gate three.
- 1.22. There is a risk that the Regional Plans will not align, and that a difference will exist in the selection of SROs. We actively engage at monthly water regional group meetings to better understand the regional reconciliation process and how the Regional Plans will link together.
- 1.23. Interaction with the WRSE Regional Plan is also a key risk to the programme. In accordance with the draft WRSE Regional Plan published in Autumn 2022, a scheme DO of 50 MI/d is required in 2031/32, with a potential requirement for a further 50 MI/d by 2040 to 2050. There remains a risk that this requirement may change in the final Regional Plan, which is due for publication in Winter 2023.

## Conclusions

- 1.24. At gate two, the GUC SRO offers a viable solution that can be built in phases to enable an early start to the delivery of water to AfW customers. We therefore recommend this SRO proceeds to gate three.
- 1.25. Key benefits of this SRO are its utilisation of existing infrastructure (providing value for money), alignment with customer views, and a significant opportunity to maintain and improve the recreational value of the canal and incorporate wider benefits to the environment, local communities and canal user groups.

- 1.26. Utilising treated wastewater from Minworth WwTW provides increased drought resilience when compared to other supply options, because wastewater is being produced and fed into the WwTW for treatment under all conditions. This water currently discharges to the River Tame and, in the event of a drought reducing river flow, may result in a restriction to the flow available for the GUC. This risk, and options for mitigation, are discussed in the Minworth SRO gate two submission.
- 1.27. The scheme also provides an alternative major surface water supply to AfW in the event of an incident affecting business-as-usual (BAU) surface water supplies from the River Thames. This enhances operational resilience, in addition to the drought resilience benefit outlined above.
- 1.28. We have carried out extensive environmental and water quality monitoring for gate two, building on the monitoring data collected in gate one. The data indicate that the main risks are limited to environmental impacts on the canal itself. Risks include the potential increased colonisation by INNS, and the potential impact on habitat and species caused by increases in water level and velocity. The provision of marginal low-flow habitat areas may mitigate the impact on the survival of juvenile fish, and the impact on other species may be mitigated by their relocation and the restoration of affected areas. Possible changes in the rivers that interact with Grand Union South have been eliminated due to the selection of the site at Leighton Buzzard for abstraction.
- 1.29. GUC is potentially complex, both operationally and in terms of procurement, due to the use of existing assets that are owned by the Trust and the number of companies involved in the scheme. As a result, suitable commercial and legal arrangements will be required as we move towards scheme implementation. We have identified a number of ownership options to consider, and gate three will focus on these in more detail, with a view to making an informed decision.
- 1.30. Tests for the suitability of Direct Procurement for Customers (DPC) have been completed during gate two. Should the Ofwat guidance develop further in the future, we will look to redo the suitability assessment. Initial evaluation of procurement options indicates that the DPC route may not be suitable for the GUC SRO in its entirety. Based on the conclusions of the DPC eligibility assessment, three works packages have been identified: the transfer to the canal at Atherstone will be implemented by STW under PR24, along with work at Minworth WwTW required under Minworth SRO. A CAP will undertake the works at the site for abstraction and treatment, and the transfer to the AfW network. The CAP may also be best placed to be responsible for construction work on the canal, with the work being undertaken by its own contractors or by the Trust under a sub-contract agreement. The Trust will be required to operate completed works on the canal, in order to meet its obligation to all users of the canal network. We will continue to develop the optimum procurement plan in gate three.
- 1.31. The ultimate size and nature of the scheme – a DO exceeding 80 MI/d – means it is defined as a Nationally Significant Infrastructure Project (NSIP), and it must therefore obtain development consent under a Development Consent Order (DCO).

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## 2. Background and Objectives

### Solution Aim

- 2.1. The solution enables reductions in the amount of water taken from the environment, reducing reliance on sensitive chalk groundwater sources in AfW's central region that feed into chalk streams which are vulnerable to climate change. The solution also supplements increased demand that will be generated through population growth within AfW's southeast region.

### National Framework Requirements

- 2.2. The GUC SRO delivers strategic and regional collaboration, providing a viable solution that transfers surplus water from STW's supply area to areas of water deficit in AfW's supply area.
- 2.3. The scheme uses existing canal assets and therefore minimises the need for construction and the use of new materials. It delivers water supply resilience by utilising existing wastewater that is being produced at all times. The scheme has the potential to provide environmental enhancement by taking advantage of remediation and proposed work along the route. At many locations along the canal, there are opportunities to provide wider benefit to the environment, local communities and canal users by improving interaction between the canal, adjacent rivers and land, alleviating flooding, increasing biodiversity, creating new footpaths, and improving public access.
- 2.4. In addition, the scheme will provide a new revenue stream for the Trust, enabling asset improvements to the existing GUC, which will extend the life and improve the performance of this valuable heritage asset.

### Regional Plan

- 2.5. AfW is focusing on reducing the amount of water taken from sensitive chalk groundwater sources by replacement with an alternative water source to meet future water demand in the central region. In support of these steps, AfW is collaborating with other water companies and third parties to secure the additional supplies that the area will need in the future. It is looking at inter-regional strategic infrastructure solutions and how water can be better moved to get it to where it is needed most.
- 2.6. The draft WRSE Regional Plan requires a scheme DO of 50 MI/d in 2031/32, with a potential further requirement of 50 MI/d by 2040 to 2050. The GUC SRO can be developed to meet these objectives.

## 3. Solution Design, Options and Sub-options

### Outline of the Solution

- 3.1. A new pipeline and existing canal infrastructure (Coventry Canal, Oxford Canal and GUC) will be utilised to convey treated wastewater from Minworth SRO in STW's supply area to areas of water deficit in AfW's supply area. Water will be abstracted from the GUC and treated prior to distribution to customers.
- 3.2. The draft WRSE Regional Plan selects the GUC to meet the DO requirements of the region by 2031/32. The scheme has been sized and costed for the transfer of 57 Ml/d and a further phased 57 Ml/d. For a transfer of 57 Ml/d, 4km of canal bank and towpath will need to be raised out of a total canal length of 131km. To accommodate a further 57 Ml/d, a total of 50km will need to be raised.

### Options and Configurations

- 3.3. Raw water will be transferred from Minworth WwTW, in STW's supply area, to a delivery point in AfW's supply area. For much of its length, the transfer will make use of existing canals owned by the Trust, with interventions as necessary along its route.
- 3.4. Three routes for transferring flow from Minworth WwTW to the canal network were shortlisted in gate one. A pipeline from Minworth WwTW to the Coventry Canal at Atherstone has now been selected as the preferred route. This option has the lowest environmental risk, with the lowest whole-life carbon, cost and use of materials compared to the other options.
- 3.5. Options for abstracting water from the canal were similarly shortlisted. The preferred site for abstraction treatment is Leighton Buzzard, with a transfer route to the AfW supply network at Chaul End Service Reservoir (SR). Criteria for selection included site constraints, energy efficiency, environmental risk, carbon emissions, cost, and social and environmental benefits. The Leighton Buzzard site was included in response to external review by stakeholders and in consideration of the risk to changes in flow regime in the chalk streams that interact with the canal network south of the Tring summit. At the abstraction point, the scheme will include a structure for removing water from the canal, storage, treatment and pumping facilities, followed by a transfer pipeline connection to the AfW supply network.
- 3.6. Further detail can be found in Annex A1.2 (Transfer Route Selection) and Annex A1.1 (Abstraction Site Selection), which set out our optioneering process.

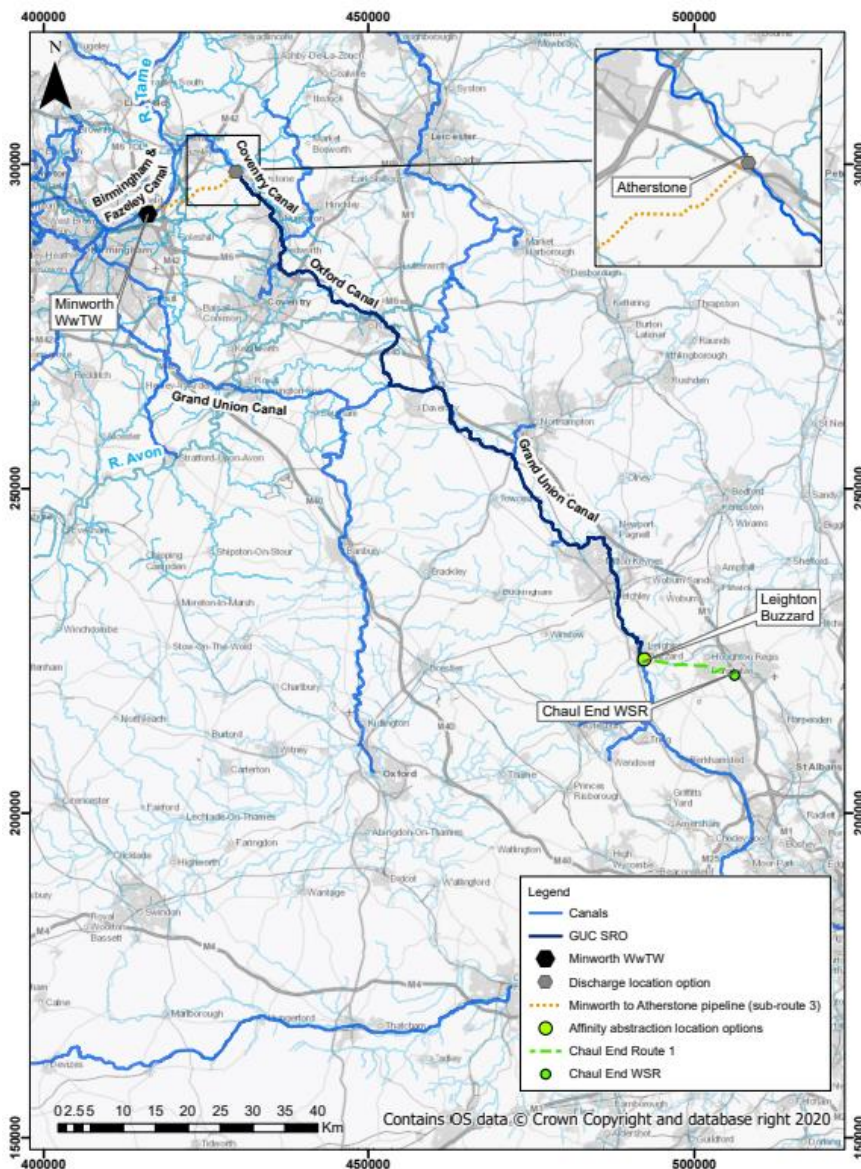
### Feasibility of Solutions

- 3.7. Reuse of existing canal assets avoids unnecessary construction and minimises the use of materials, resulting in carbon and cost benefits. The GUC can be construction ready by Q3 2027, with an earliest DO date of Q2 2032.
- 3.8. No significant adverse effects on designated Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites are foreseen, due to the lack of pathways between the GUC SRO and protected sites.

## Description of the Key Assets to be Constructed

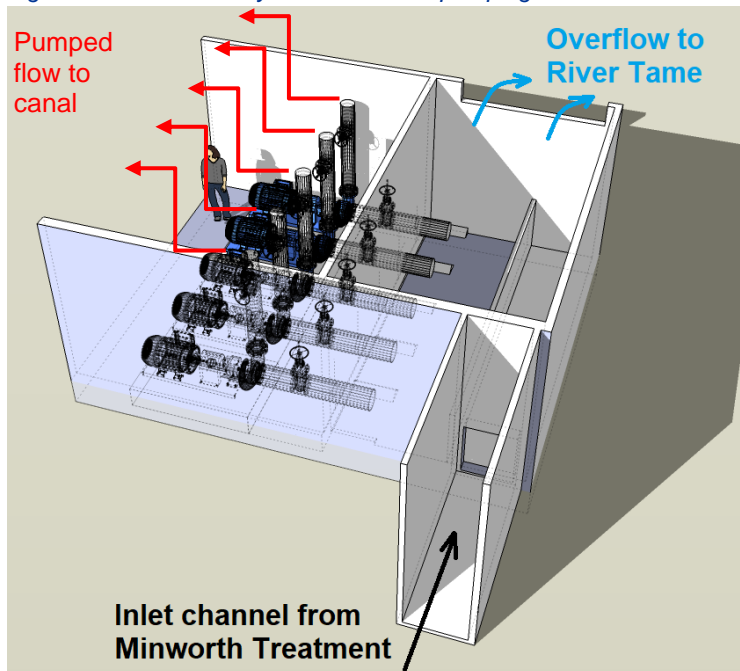
- 3.9. Flow will be transferred from Minworth WwTW to the existing canal waterways in the northern section of the GUC. Upgrades to existing canal assets are required to facilitate additional flows and to ensure sufficient freeboard to the canal is maintained.
- 3.10. In the southern section of the GUC, water will be abstracted from the canal and treated prior to distribution to AfW customers (refer to Figure 3-1 for scheme layout).

Figure 3-1: Scheme layout



- 3.11. Enhanced treated final effluent will flow from Minworth WwTW into a new pumping station (refer to Figure 3-2) located on the Minworth WwTW site. From here, flow will be transferred eastward via a new rising main over a distance of approximately 20km to a discharge point into the Coventry Canal at Atherstone. A pressure break tank will be located along the pipeline route at a high point near to Atherstone, to enable flows to gravitate to the canal discharge point.

Figure 3-2: Indicative layout of Minworth pumping station



- 3.12. Transferred water will then progress along the Coventry Canal by gravity, and into the Oxford Canal at Hawkesbury Lock. Flows will need to bypass Hawkesbury Lock via a low-lift pumping station. The Oxford Canal will then convey the water to the GUC and on to a pumping station at Braunston Junction. The majority of the flow along the Oxford Canal will be by gravity; however, a pumping station will be required to bypass the locks at Hillmorton.
- 3.13. From Hillmorton to the abstraction and treatment site, a further four lock bypass pumping stations are required south of Milton Keynes at Fenny Stratford, Stoke Hammond, Three Locks and Leighton. The GUC section also requires eight gravity bypasses to “downflow” locks at the Wilton Marine Lock Flight, Stoke Bruerne Lock Flight and Cosgrove Lock.
- 3.14. Bank and towpath raising will be required to accommodate the increase in water levels along the canal and will range from 100mm up to 250mm. For a transfer of 57 Ml/d, only 4km will need to be raised out of a total canal length of 131km from Atherstone to Leighton Buzzard, and at 115 Ml/d approximately 54km will require raising, as shown in Table 3.1. Modifications to 57 existing waste weirs will prevent water loss to adjacent watercourses. Piped bypass arrangements or canal widening will be needed at four hydraulic constraint points to avoid exceeding velocity limitations for canal operation, set at 0.3 m/s to ensure that boat navigation is not hindered. Similarly, five existing bridges will need to be modified (to maintain head clearance) for the 115 Ml/d scheme.



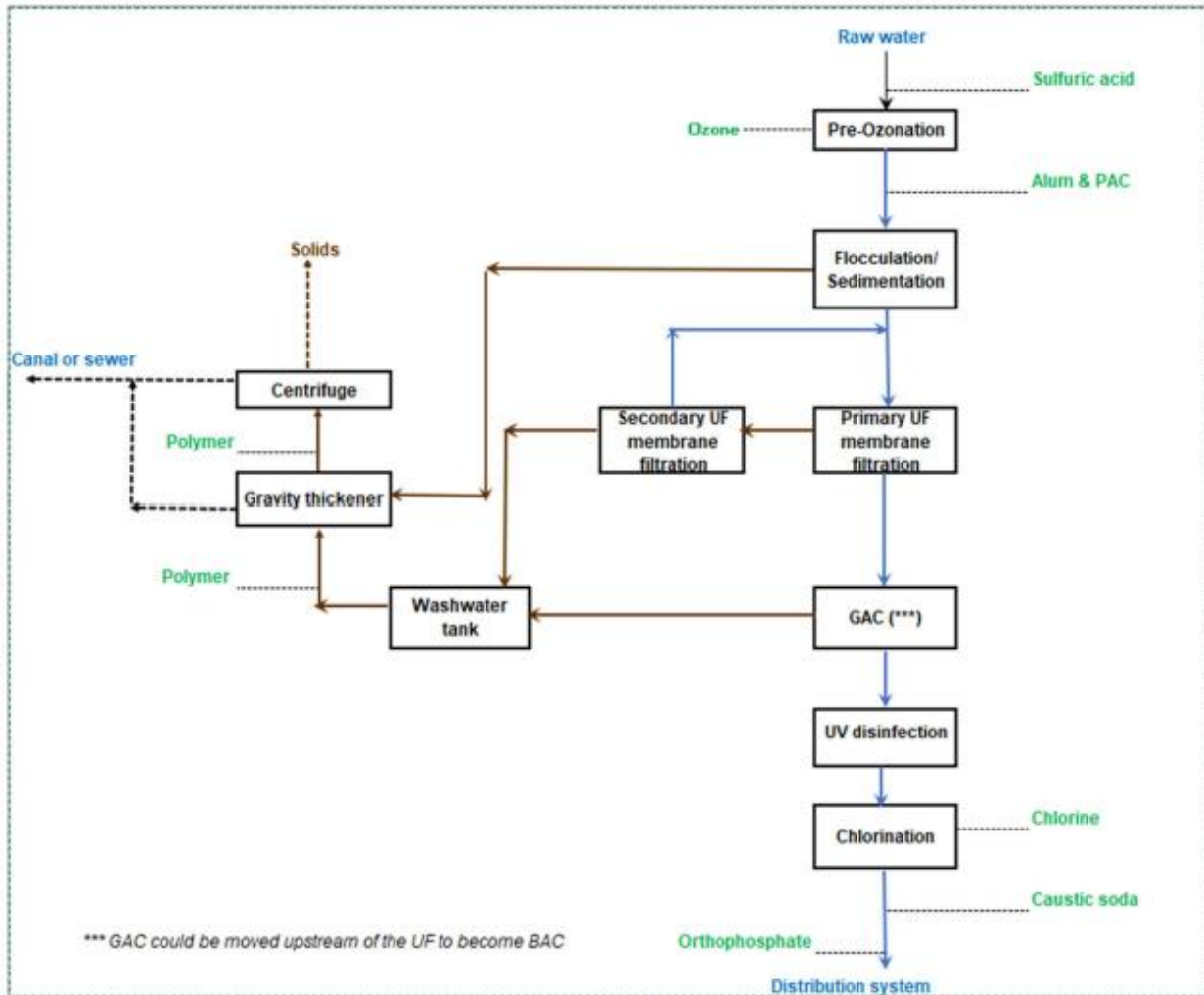
Table 3.1: Length of bank raising required by 57 MI/d and 115 MI/d schemes<sup>3</sup>

Bank raising (mm)	Scheme Capacity	
	57 MI/d	115 MI/d
	Length of bank raised (km)	
>50mm	9.0	45.0
>100mm	0.0	38.4
>150mm	0.0	7.5
>200mm	0.0	9.0
<b>Total bank raising</b>	9.0	99.9

- 3.15. Supervisory control and data acquisition (SCADA) will be used to enable automation of the scheme pumping stations and treatment works during operation to provide the particular DO required by AfW.
- 3.16. Flow is proposed to be abstracted from the GUC just south of the A4146 bridge, adjacent to the River Ouzel and near to Leighton Buzzard. Flow will therefore pass beneath the River Ouzel and be pumped into an operational raw water reservoir, sized to provide five-day storage (575 MI), which will enhance the resilience of the option, before gravitating into the first stage of treatment.
- 3.17. The site for the treatment works is close to the abstraction point, slightly raised from the river and canal and adjacent to an operational sand quarry (Grovebury Road). Additional interstage pumping will be required in the treatment works. A block diagram of the proposed treatment works is given in Figure 3-3.

<sup>3</sup> Note that bank raising is total, taking account of both sides of the canal.

Figure 3-3: Treatment works block diagram



- 3.18. Final high-lift pumps will transfer potable treated water from a treated water storage reservoir, via a new pipeline approximately 15.6km long, to a new clean water holding tank at the existing Chaul End SR.
- 3.19. Given the potential for these works to have a long lead time, required power supplies will be applied for and procured in advance.

## 4. Water Resource Assessment

### Utilisation

- 4.1. In gate one, the scheme utilisation profile had not yet been established. During gate two, water resources network modelling has been used to consider the demand profiles generated when a new water resource is introduced into the system, primarily to replace groundwater sources that feed into chalk streams which are vulnerable to climate change.

- 4.2. Scheme utilisation is expected to be greatest during the summer months, at around 80% during dry-year demand events. Utilisation will increase during significant droughts (>1 in 50 years).
- 4.3. Two utilisation scenarios have been modelled for the GUC SRO, as shown in Table 4.1. The first is for the normal dry-year demand, and the second is for a significant drought period. The transfer may also be required to mitigate other supply issues, such as outage or source shutdown due to pollution events within AfW’s region.

Table 4.1: Anticipated scheme utilisation

Period	Utilisation (%)	
	Normal dry year	Drought year (> 1 in 50 year)
October - April	25	25
May	55	65
June - August	80	100
September	55	65

- 4.4. Utilisation profiles will be further revised in gate three as better data is developed, or there are changes to the assumptions upon which they are based. The ‘drought year’ figures reflect the critical period.

## Water Resource Benefit

- 4.5. Capacity requirements and utilisation profiles have been used by AfW to establish that the scheme will improve the ADO of the AfW system by providing a drought-resilient supply source of 50 to 100 Ml/d ADO that could be used year-round. This spare capacity can be utilised when demand increases or supply is lost, which means that new sources of water will only need to be fully utilised during the summer.
- 4.6. The scheme has been sized to take account of AfW's limited water storage facilities and to provide for any losses during the treatment process.
- 4.7. The scheme in the first phase will convey a year-round operational minimum turnover flow of 14 Ml/d (25% of 57 Ml/d).
- 4.8. Throughout gate two, we have developed and validated a baseline model of the canal system and have applied the GUC transfer to this model. Annex A.2 (Final Modelling Report) explains the modelling tasks, outcomes and further work required in more detail.
- 4.9. One of the items for further work in gate three is the requirement to amend the Trust’s typical operational control parameters within the GUC model for controlling levels in canal pounds along the SRO transfer route. Amending the control parameters would ensure the model operates more smoothly, minimise spillage and ensure there are no resulting transfer deficits. The activation of back-pumps is controlled by canal water level and, as the model currently operates there is a demand on storage in the Trust’s reservoirs to bring pound water levels back to a “healthy” level. Appropriate modification to the model operational control parameters will reduce the amount of water the model draws from reservoirs. In reality, the utilisation of the GUC SRO transfer will maintain canal water levels and therefore enable reduced use of the Trust’s water storage assets. This will create greater resilience for the system, so in

times of hydrological drought the storage assets are more likely to be full and ready to support any water shortages in the canal.

## Long-term Opportunities and Scalability

- 4.10. The GUC SRO has the potential to deliver significant wider resilience benefits to the natural environment, as well as enhancing the canal user experience. Within the scope of works required to construct the infrastructure for transfer of raw water from Minworth WwTW to Leighton Buzzard, there are opportunities to provide an enhanced environment, to mitigate potential losses elsewhere, and to increase the overall biodiversity and natural capital of the scheme. For instance, at canal and river interfaces, there may be opportunities to introduce additional wetland habitats that enhance the environment, as illustrated in paragraph 6.30.
- 4.11. The willingness-to-pay surveys undertaken show that customers see value in opportunities to incorporate low-cost benefits associated with schemes similar to the GUC SRO, such as facilities for walkers, cyclists and kayakers, that provide access to exercise, fresh air and mental health benefits. In addition, customers see the potential for environmental additions such as habitat creation for wildlife, and appreciate the limited disruption associated with utilising existing infrastructure. The outcome of these surveys will be used to inform subsequent design stages in gate three onwards.
- 4.12. In response to RAPID's gate one query regarding interactions with the Thames Water Oxford Canal Scheme: This relatively small scheme is being investigated by Thames Water and the Trust, and may transfer 15 Ml/d from the Midlands to Thames Water's region via the Oxford Canal. An independent water source will supply the Oxford Canal transfer scheme. The Oxford Canal is being selected for utilisation between 2045 and 2060. A section of the Oxford Canal required for this Thames Water option will also be utilised by the GUC SRO. This additional flow, if operated at the same time as the GUC at full utilisation, will result in a small increase in canal velocity and water level in the upper reaches of some canal pounds. In addition, pumping stations to transfer flows around uphill locks and gravity bypass arrangement to downhill locks will be required for this additional capacity.
- 4.13. With regard to the scalability of this scheme, we provided WRSE with multiple costed options, including a phased option to build in two parts. The regional model then has the ability to select the best value version of this SRO. The trigger point for WRSE in its draft Regional Plan is the success of demand management. If demand management targets are met, the GUC is required in a phased approach. If they are not met, the 115Ml/d version of GUC is likely to be required in a single phase.

## Operational Supply Resilience

- 4.14. A major element of the gate two Minworth SRO investigations was to consider the potential for the hands-off flow (HoF) at North Muskham being met more frequently when the SRO is in use, because the discharge of treated wastewater from Minworth WwTW to the River Tame will be reduced. Water storage options are being considered to provide a source of water to the GUC SRO during such an event, so that Minworth WwTW could stop diverting flow from the River Tame. This work is being carried out under the Minworth SRO and will be concluded in gate three.
- 4.15. The GUC SRO will incorporate five days' raw water storage (575 MI) at the site for abstraction and treatment near Leighton Buzzard. This will increase scheme resilience

in the event of supply interruption along the transfer from Minworth WwTW to Leighton Buzzard.

- 4.16. An operational emergency plan and operational resilience plan will be developed in gate three for use in the event of an incident affecting the scheme operation. The plan will include specific response actions which will be tested annually: for example, in the event of a spillage causing pollution to the canal, mobile equipment procedures will be in place to isolate and pump over the affected sections.

## Scalability

- 4.17. This report presents an option to build GUC SRO outright, or the ability to build it in a scalable way. This phased approach allows for the construction of the GUC SRO to provide 57 Ml/d in the first phase, with a potential increase of a further 57 Ml/d in the future if required. The first phase will involve the construction of structures and the purchase of land with capacity for the full 115 Ml/d scheme. Similarly, this first phase will involve the installation of mechanical and electrical (M&E) equipment sufficient to enable the 57Ml/d transfer.
- 4.18. Once the second phase is required, additional M&E equipment will be installed to enhance the capacity of the transfer to the full 115 Ml/d, on land already purchased and developed in phase 1.
- 4.19. Similarly, canal bank and towpath raising will be constructed to meet phased requirements, and a modular works construction will be adopted for the treatment facilities to enable simple future expansion.
- 4.20. For the pipeline to Atherstone, monitoring of biofilm growth will be required, and the main will need to be cleaned before the second phase is brought into operation, to prevent a sudden sloughing of deposits in the pipeline built up over time that could cause water quality issues.
- 4.21. To maintain chlorine residuals within Regulation 26 limits of the Water Supply (Water Quality) Regulations in the pipeline to Chaul End SR, increased chlorine dosing will be required at the works. Monitoring, with a procedure for trimming down chlorination as demand increases, will be necessary.
- 4.22. This phased approach offers an efficient means of option development for customers, and prevents initially oversizing an asset if the full need is not required immediately.

## Infrastructure Resilience to the Risk of Flooding and Coastal Erosion

- 4.23. Flood risk to various scheme components is assessed in Table 4.2, along with proposed design solutions to ensure safe operation and management.

Table 4.2: Design solution to flood risk

Item	Component	Flood risk	Design solution
1	Minworth pumping station	The site is approximately 700m from the River Tame. Parts of the wider Minworth site are at risk of flooding, with up to a 0.1% (1 in 1000) chance in any given year (Zone 2). The pumping station site is outside the flood risk area; however, the access route will be at risk.	The threshold to the pump sump, all above-ground equipment, and the access road will be set 300mm above the estimated flood level.

Item	Component	Flood risk	Design solution
2	Minworth to Atherstone pipeline	The area around Minworth WwTW and the River Tame are subject to flood risk. The proposed pipeline route seeks to avoid these areas as much as possible.	Appropriate pipe bedding and materials to protect against floatation and erosion.
3	Canal infrastructure including new pumping stations	The proposed pumping stations are not affected by documented flood zones. However, a number of construction site access routes will cross flood zones.	Temporary works arrangements that do not contribute to increased flood risk elsewhere will be developed.
4	Abstraction structure	The site is at risk of flooding, with up to a 0.1% (1 in 1000) chance in any given year (Zone 2).	The pumping station elements of the abstraction works will be designed to ensure that electrical and control systems are located sufficiently above the estimated flood level.
5	Raw water storage and treatment works site	Located outside documented flood zones.	Management of onsite surface run-off from impermeable areas during operation.  Embankment toe and drainage to be designed for stability under extreme events.  Particular attention to temporary works to avoid environmental damage from run-off during earth-moving works.
6	Pipeline from treatment works to Chaul End SR	The route is at very low risk from flooding. Only a short 200m section, where the pipeline and the A505 cross Ouzel Brook, is shown as being at risk.	Appropriate pipe bedding and materials to protect against floatation and erosion.

- 4.24. In gate three, we will carry out an in-depth Flood Risk Assessment (FRA) of the risk of flooding to all components, to ensure implementation of design solutions that are resilient to flooding.
- 4.25. The canal infrastructure provides a potential flood relief benefit through run-off interception in the event of heavy rainfall, and may be able to mitigate some existing flooding problems through utilisation of the scheme abstraction pumping station and raw water storage at Leighton Buzzard. Such an arrangement is likely to be complex, and needs to be investigated in gate three.
- 4.26. The scheme is most likely to be utilised when conditions are dry and/or hot, and it is therefore unlikely to be operational under most flood conditions. In the event of an intense summer storm, the SCADA would prevent water being added to a system already at capacity and would instead move the water that is already in the system.

## 5. Drinking Water Quality Considerations

- 5.1. Water quality monitoring, as outlined in Annex B1 (Water Quality Monitoring), started in May 2020 and has continued throughout gate one and gate two. The sample locations and parameter suites have changed and grown as our understanding of the scheme requirements and canal environment has increased.
- 5.2. The selection of Leighton Buzzard as the abstraction location has led to the cessation of all water quality monitoring downstream of the Tring summit during gate two. Monitoring at Tring (downstream, and elevated topographically, from Leighton Buzzard) will continue as a control point for the scheme. Monitoring at some locations in the upper canal has also been removed as the Atherstone discharge location has been selected as the preferred discharge location.
- 5.3. We have continued to engage with the EA, Drinking Water Inspectorate (DWI) and NE on progress with changes to the monitoring programme, cessation of monitoring downstream of the Tring summit, and the findings as they became available.
- 5.4. During gate two, we have developed hydraulic models to understand the movement of water through the canal and its potential water quality and Water Framework Directive (WFD) impacts. We have used the water quality data collected through the SRO to calibrate the model. We have set up a working group with the EA to work through the WFD and permitting requirements, which has been constructive through gate two.
- 5.5. The additional treatment at Minworth WwTW has been designed based on the monitoring, modelling, and engagement with internal and external technical experts.
- 5.6. As the monitoring is of the raw canal water, there will be parameters that are present at higher concentrations than are acceptable in drinking water. At the Leighton Buzzard sample location, 19 parameters have been shown to exceed the acceptable drinking water values. The treatment team is working closely with the engineering design team to make sure these risks are mitigated within the treatment design.
- 5.7. The All Company Working Group (ACWG) treated water methodology was completed at gate one. This has been updated with the gate two monitoring, and now represents Leighton Buzzard as the abstraction location. We have engaged with water quality experts within AfW, the Trust and STW to make sure they understood the scheme requirements and sampling outputs, as well as the DWI on a quarterly basis.
- 5.8. A review of “emerging substances” risk has been carried out, aligned to the methodology that had been discussed with the DWI and EA by Thames Water for its SROs. Using STW’s catchment information for Minworth WwTW, and the water quality monitoring at gate two, a suite of 51 parameters was created for gate three monitoring at Minworth WwTW and Leighton Buzzard, to understand the presence of these emerging parameters in the source water and abstraction point for this SRO. Sampling for this additional suite commenced in September 2022.

## 6. Environmental Assessment

- 6.1. The environmental investigations during gate two have found no showstoppers or major issues that would prevent the GUC SRO from progressing to gate three. The major risk from gate one (interaction with chalk streams south of the Tring summit) has been removed due to the selection of Leighton Buzzard as the abstraction

location, which is upstream and topographically lower than Tring. The EA has been engaged throughout the decision-making process and was supportive of the Leighton Buzzard site selection.

- 6.2. Environmental monitoring continued during Summer 2021 as the gate one paper was submitted, and has been maintained throughout gate two. This has improved our knowledge of the canal environment, which was previously poorly understood. As our knowledge of the assets and the environment around these assets improves, so does our understanding of the data we still require, and this informed our monitoring programme throughout Summer 2022 and beyond.
- 6.3. No major WFD or Habitats Regulations Assessment (HRA) issues are flagged at this stage, based on current environmental interactions and planned mitigation measures, although some minor risks, deemed acceptable, do remain.
- 6.4. Scheme design has looked to minimise carbon impacts, in line with the climate commitments of the scheme's partner companies and Ofwat net zero principles. In particular, the reduction of greenhouse gas (GHG) emissions will be prioritised before the use of offsets. This includes examination of whole-life carbon impact and identifying the parts of the scheme which have the greatest carbon footprint for review and revision.

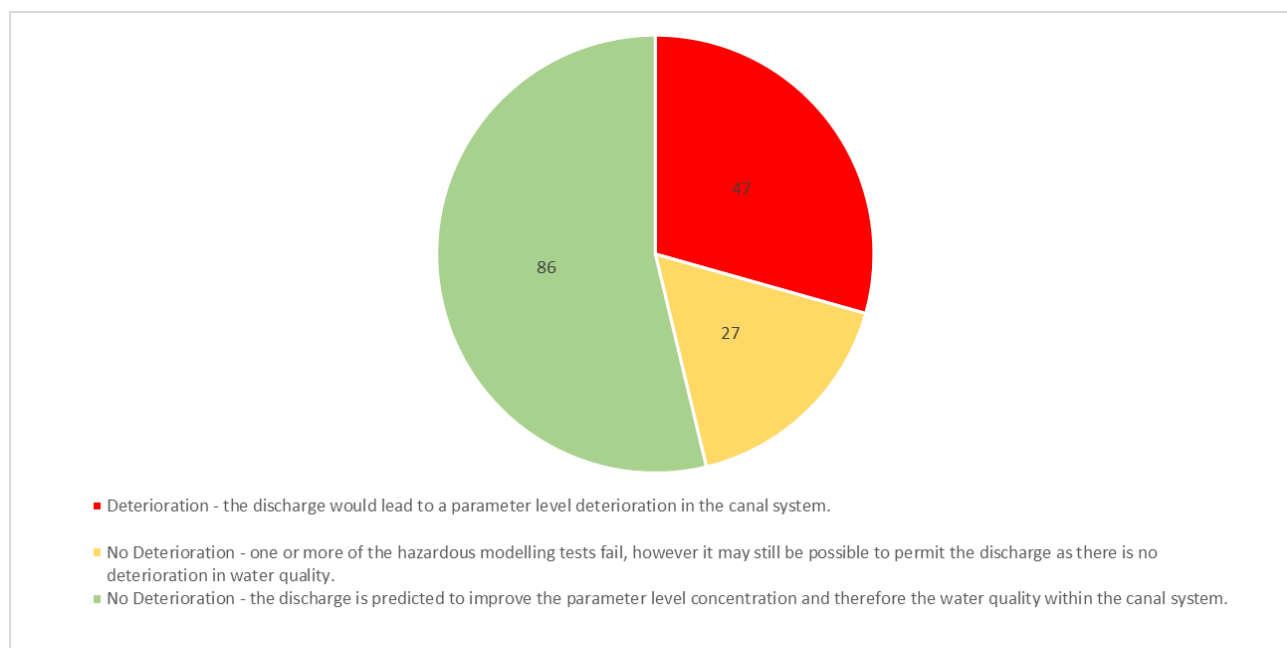
## Water Framework Directive (WFD)

- 6.5. We have identified a preferred solution at gate two that has allowed the list of waterbodies requiring WFD assessment to be redefined for gate two. The WFD assessment has therefore been refined since its gate one iteration. Refer to Annex B3.3.4 (Water Framework Directive) for details.
- 6.6. Through the identification of additional watercourse connections during the gate two investigations, additional waterbodies have been added to the assessment, whilst others have been removed due to the refined geographical extent of the scheme. Key WFD waterbodies (e.g. the chalk streams River Bulbourne and River Gade), which were previously considered as being of importance at the southern end of the route, no longer require consideration due to the selected abstraction location.
- 6.7. 26 waterbodies were assessed at gate two, of which 19 required a Level 2 WFD assessment. The Level 2 assessment showed there are potential WFD compliance risks associated with the operation of the scheme, though the majority of these are anticipated to be minimised through design of either water quality treatment or structural design and operational parameters that reduce the risks to an acceptable level.
- 6.8. The risk assessment will be further reviewed through gate three as the scheme design develops and further environmental studies are carried out.
- 6.9. A statistical water quality model was developed to assess the impact of the Minworth WwTW raw water discharge at Atherstone, and any additional water quality impact downstream at Daventry and Leighton Buzzard. It concluded that, of the 160 water quality determinands modelled, 47 may require treatment to higher than the present standards at Minworth WwTW, in order to prevent deterioration in the receiving canal system. A further 27 determinands fail at least one modelling test, but it may still be possible to permit their discharge as there is no water quality deterioration. As illustrated in Figure 6-1, the remaining 86 determinands pass all tests and would lead to improved water quality in the canals, with some leading to WFD class improvement.



This information has been fed back into Minworth SRO to inform treatment work design.

Figure 6-1: Percentage of 162 determinands driving deterioration or improvement in water quality within the canal system



## Habitats Regulations Assessment (HRA)

- 6.10. An “informal” HRA has been undertaken at gate two, as per ACWG guidelines, in order to inform any likely impediments to the practicality or deliverability of the scheme. This follows the methodology of a HRA to identify the risk of any non-compliances at the decision-making stage, but is not part of a statutory plan or programme. It delivers the duties of Statutory Undertaker with regard to ensuring that the works comply with the requirements of the regulations. This ensures that the potential effects of the scheme are fully considered at each gate.
- 6.11. The HRA has been refined since gate one, and this assessment has been conducted on the revised version of the transfer through the Minworth to Atherstone pipeline and the Atherstone to Leighton Buzzard canal transfer route. The HRA assesses the impact the scheme may have on SPAs, SACs and Ramsar sites.
- 6.12. The Stage 1 HRA screening identified one site that may have a “likely significant effect” from GUC SRO. The Upper Nene Valley Gravel Pits SPA/Ramsar site was taken forward to HRA screening Stage 2 due to the hydrological connection to the GUC from the Wilton Brook/River Nene. Stage 2 HRA takes the form of an Appropriate Assessment, for which we have engaged NE.
- 6.13. The Appropriate Assessment of the Upper Nene Valley Gravel Pits shows a low likelihood of any changes in water quality or INNS as a result of the scheme. This is due to the treatment at Minworth WwTW improving the water quality in the canal, and no extra flow entering the River Nene due to the lockage system where the GUC feeds the River Nene, as well as scheme design to stop the extra flow in the canal passing down the Northampton Arm.

- 6.14. As no pathways have been identified through which European Sites could be affected by the implementation of the scheme, no further Appropriate Assessments are necessary.
- 6.15. GUC SRO is considered unlikely to have an adverse effect on integrity of SACs, SPAs or Ramsar sites, and therefore no further stages in the HRA process will be necessary until the statutory HRA is required as part of the statutory planning process. Annex B3.3.3 (Habitats Regulations Assessment) explains the HRA process and results in further detail.

## Environmental Appraisal

- 6.16. The gate two environmental investigation programme builds on the gate one findings and is designed to fill identified gaps in knowledge. The scopes of work incorporate the feedback provided by EA and NE at gate one. We have continued to engage with the EA and NE throughout gate two, with regular meetings, input into scope, and presenting and receiving reviews on written reports. We will continue to work closely with regulators and provide robust technical responses to their queries.
- 6.17. Annex B3.3.5 (Environmental Appraisal Report) brings together the environmental field work and reports generated for this SRO during gate two. The environmental appraisal covers the following areas of study:
- Regulatory assessments: HRA, WFD, Strategic Environmental Assessment (SEA), Biodiversity Net Gain (BNG) and Natural Capital.
  - Waterbody connections of the canal.
  - Fish survey report.
  - Habitats and protected species investigations.
  - Sediment investigations.
  - INNS assessments.
  - In-combination effects.
- 6.18. These gate two assessments have not identified any regulatory barriers that would stop the scheme progressing to gate three. There is a minor increased risk for the spread of INNS within the canal, due to increased flow, but it is deemed very unlikely that any INNS lifeforms could survive the treatment processes at Minworth WwTW to be present within the initial pipeline transfer to the canal. The canal, by nature, is already connected with boats navigating its length. The construction and operational activities will incorporate best biosecurity measures into the design and operational protocol to avoid introducing any further INNS risk.
- 6.19. Further surveys that are required in gate three include (but are not limited to):
- Ecology walkover survey of the pipeline route and investigations along the canal route, e.g. water vole surveys.
  - eFishing and eDNA surveys.
  - Heritage environmental survey along the pipeline route.
  - Further field surveys in Summer 2022 to capture the full range of INNS present along the transfer route and within hydraulically connected waterbodies.
  - Additional sediment sampling in conjunction with additional water quality sampling.

## Natural Capital and Biodiversity Net Gain (BNG)

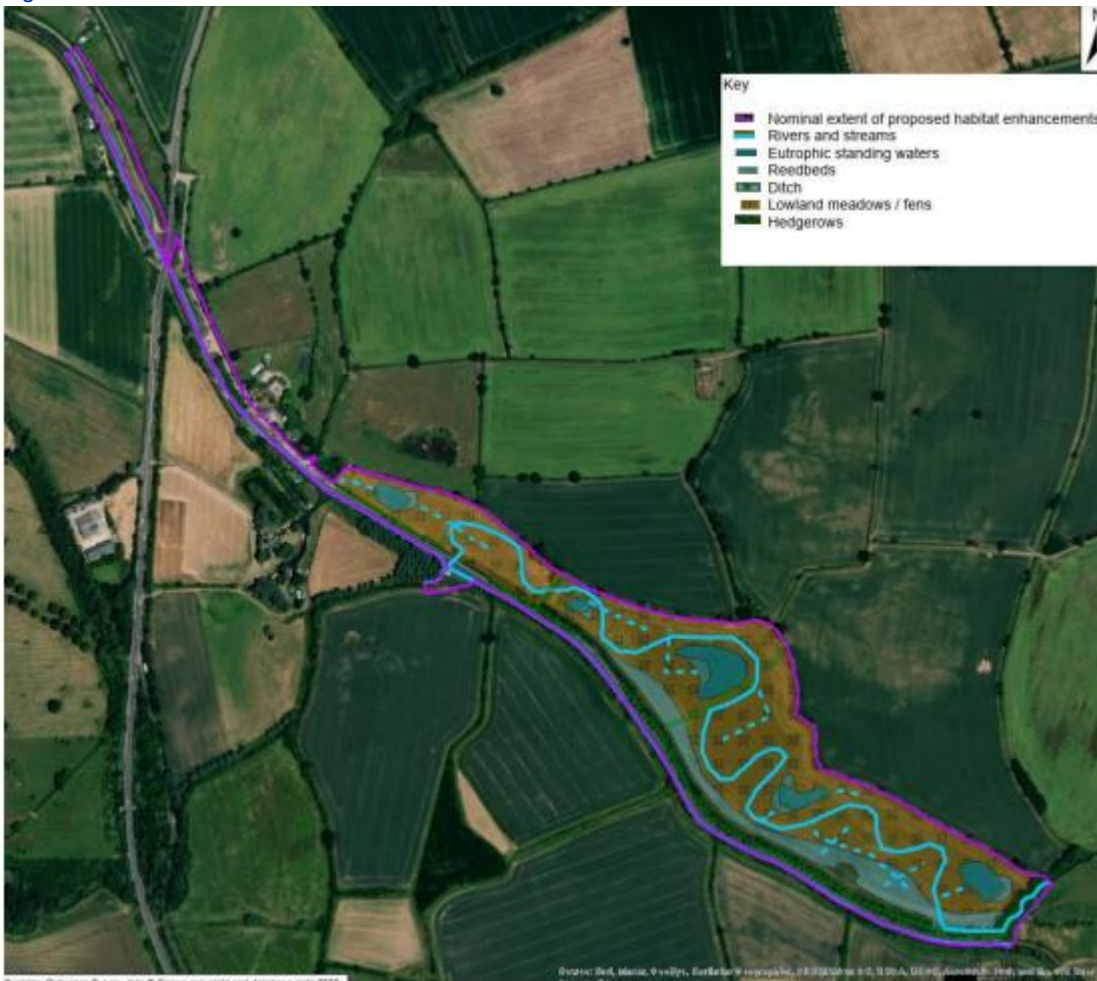
- 6.20. The RAPID gate two guidance states that BNG assessment “should support the net gain actions in the Government’s 25-year Environment Plan and aim to meet the likely future requirements as per the Environment Act.” The SROs will aim to achieve a minimum 10% net gain in biodiversity units relative to the site’s baseline biodiversity value.
- 6.21. As part of the environmental appraisal, a natural capital baseline was developed. This reported the total quantity of each natural capital unit to give a high-level view of the current natural capital condition.
- 6.22. Implementation of GUC SRO would cause some temporary and permanent loss of natural capital stocks during construction. However, best-practice mitigation and reinstatement/compensation of habitat means that there will be little to no change in most natural capital stocks post construction.
- 6.23. The proposed pipeline route from Minworth WwTW to Atherstone is, in its current design, understood to likely cause the permanent loss of ancient woodland. Ancient woodland is a high-value natural capital stock that cannot be replaced or replicated. As such, any loss of this habitat is recorded as “presumed permanently lost” in the assessment. The gate two assessments are based on worst-case scenarios and concept designs which we intend to refine further in gate three to minimise the impact on sites such as priority habitats and ancient woodland.
- 6.24. The scheme is likely to result in a loss of BNG habitat units due to the temporary loss of natural capital assets during construction. Mitigation and enhancement opportunities for the scheme have been suggested within Annex B3.3.2 (Natural Capital and BNG Assessment Report), which can work in tandem to reduce the loss of BNG and introduce net gain. These opportunities will be developed further during gate three.
- 6.25. The opportunities identified in the natural capital and BNG assessment have the potential to contribute to UK Government ambitions for environmental net gain (ENG). This could take the form of habitat compensation, creation and/or species relocation. Any projects would need to be taken forward based on a comprehensive understanding of the interaction between natural systems and social uses of land.
- 6.26. For gate three, GUC SRO will develop the design of the Leighton Buzzard abstraction site to enable a more reliable and in-depth natural capital and BNG assessment to be undertaken.
- 6.27. Through gate two, we have identified opportunities to create and improve the natural capital of the canal and habitat, onsite and off-site, through local schemes, Nature Recovery Networks and wildlife corridors. This will allow the scheme to achieve the statutory 10% net gain in BNG and increase the provision of ecosystem services, therefore aiding in developing more resilient options for the future provision of water for GUC SRO.
- 6.28. Further natural capital benefits are described in paragraph 6.29 onwards.

## Non-Water Resource Benefits

- 6.29. There are a number of improvement opportunities identified along the transfer route that could provide environmental and/or societal benefits as part of the GUC SRO engineering works. Refer to Annex A1 (Engineering CDR, Appendix D) for additional benefit examples.

- 6.30. Seven case studies for improvements were created, each of which could be applied at many locations along the transfer route. These case studies cover a wide range of options, including improving the natural environment in the vicinity of the canal, making the canal more accessible for recreation, and renewable energy generation. One example is at the River Tove Lock Flight (see Figure 6-2). :
- At the River Tove Junction, there is a series of five locks that drops the water level of the canal by approximately 12m. To maintain safe operation of the locks, the transfer flow will bypass the locks by gravity pipework. The bypass is approximately 680m long.
  - The canal has multiple side overflow (waste) weir connections to the River Tove, a sensitive but modified river (with culverted and straightened channel sections). During dry weather, the weirs do not operate but can collect large amounts of debris, floating vegetation and algae. During flow surges on the canal (e.g. from storm water inflows, upstream lock operations, etc.) this debris and lower-quality canal water is discharged into the river. The water level is expected to rise at this location by 20mm.
  - The canal improvements will ensure no extra water is lost through the overflow weirs and could also create aquatic habitat through construction of buffer ponds, improvement of ecological status by capturing soil and algal build-ups, and power generation at the overflow points to help power locks.
- 6.31. There are opportunities to take advantage of the construction works proposed to improve the interaction between the river and canal, and introduce additional wetland habitats that both enhance the environment and provide operational benefit to the scheme (e.g. around managing surge flows and weir discharges). There is the potential to provide the following:
- Flood alleviation.
  - Habitat creation
  - Introduction of rare plants.
  - Reedbeds.
  - Realignment of the river channel.
  - Footpath creation.
- 6.32. By providing these improvements, there would be a significant increase in biodiversity compared to the current conditions at the site. This initial improvement could then become the focus of further improvements in the future.

Figure 6-2: Potential for introduction of wetland habitat



## Carbon and Greenhouse Gases (GHG)

- 6.33. STW and AfW have made corporate commitments to net zero, and the Trust is developing a net zero strategy.
- STW is committed to achieving net zero GHG emissions by 2050, in line with its social responsibility as a FTSE100 company, Water UK’s Net Zero 2030 Routemap, and the UK Government’s policy expectations for water companies. STW’s Triple Carbon Pledge comprises net zero operational carbon emissions, energy from 100% renewable sources and an all-electric fleet (where available) by 2030. Additionally, STW has set Science Based Targets to drive down Scope 1, 2 and 3 emissions.
  - AfW has committed to becoming carbon negative for all three scopes by 2030, based on six core principles that include the empowerment of customers and influencing carbon-related and environmental public policy issues.
  - The Trust is subject to a number of mandatory energy and carbon emission reporting requirements, including Streamlined Energy and Carbon Reporting (SECR) requirements and the Energy Saving Opportunity Scheme (ESOS). The Trust has recently expanded its carbon emissions accounting to include Scope 3 emissions.
- 6.34. Our solutions will be designed in line with Ofwat’s net zero principles, and will align with UK Government net zero targets, encompassing both operational and embedded

emissions. Solutions will follow the “carbon hierarchy”, prioritising the reduction of GHG emissions before utilising offsets. Steps taken by the GUC SRO to contribute to the Government’s net zero goal are described in paragraphs 6.36 to 6.43 and detailed in Annex A1.11 (Cost and Carbon), which follows the latest Government guidance on the cost of carbon and considers current operational carbon reduction opportunities linked to the UK Water Net Zero Routemap. The carbon estimates that have been calculated cover the BS EN 15978 Life Cycles A1 through to B5. This accounts for carbon from “cradle” to “end of life” and typically would capture 70-80% of the scheme’s whole-life carbon impact.

- 6.35. Scope 1 emissions are those directly owned and controlled, e.g. gas boilers for heating a building, or gas emissions as waste products from treatment processes. Scope 2 emissions are indirect, caused by the scheme but owned or controlled by another entity, e.g. acquiring electricity for operating. Scope 3 emissions occur in the value chain from a source not owned and controlled by the scheme, e.g. the materials manufactured and supplied for construction of the scheme.
- 6.36. An initial assessment of indirect emissions associated with construction and operation was made to identify those parts of the scheme which have the greatest carbon impact, for review and reduction.
- 6.37. Carbon reduction opportunities through elimination, reduction or substitution have been evaluated, and, where appropriate, we have selected construction materials that enable carbon compensation/offsetting, such as utilisation of timber from a sustainable source.
- 6.38. Opportunities have been identified to reduce carbon contribution from construction activities, including greater use of:
  - Hybrid and fully electric vehicles for the transport of raw materials, alongside the active optimisation of supply chain logistics to reduce road and air transport.
  - Local suppliers to minimise transport requirements.
  - Renewable energy sources on site, such as solar power and micro wind turbines.
- 6.39. Our current estimate of embedded and operational carbon for GUC SRO is shown in Table 6.1.

Table 6.1: Carbon summary for 115 Ml/d scheme

Element	Construction (tCO <sub>2</sub> e) <sup>4</sup>	Replacement (tCO <sub>2</sub> e)	Operation (tCO <sub>2</sub> e)	Whole Life (tCO <sub>2</sub> e)
<b>Minworth Pumping Station</b>	1,585	4,039	438,936	442,975
<b>Minworth-to-Atherstone Pipeline</b>	20,038	2,469	160	22,667
<b>GUC Canal Works</b>	30,632	42,352	11,270	83,287
<b>Abstraction</b>	1,959	1,335	17,098	20,392
<b>Raw Water Storage</b>	53,783	6,307	0	60,089
<b>Treatment Works</b>	148,013	244,099	1,033,122	1,425,234
<b>Treatment Works to Chaul End SR Pipeline<sup>5</sup></b>	16,305	2,075	341,270	359,649
<b>TOTAL</b>	<b>272,352</b>	<b>302,676</b>	<b>1,841,856</b>	<b>2,414,293</b>

- 6.40. The scheme will be designed to minimise the production of carbon and to utilise low-carbon materials. It will consider high-efficiency pumps and low-energy/low-carbon

<sup>4</sup> Tonnes carbon dioxide equivalent.

<sup>5</sup> Including pumping.

water treatment processes in order to minimise Scope 2 indirect GHG emissions associated with the purchase of power during operation. Pipeline routes have similarly been selected to minimise pumping, whilst not taking precedence over other environmental criteria such as biodiversity and other sustainability benefits or impacts. The scheme control philosophy will ensure operation is minimised to match customer or process demand requirements; operational carbon emissions will be monitored, and a baseline established in order to consider where there is scope for further reduction of Scope 2 emissions.

- 6.41. Where appropriate, energy recovery from the canal and pumped water transfers will be implemented. In gate three, clear carbon mitigation plans will be established to monitor and evaluate the outcome of carbon decisions and their impact on Scope 1, 2 and 3 emissions. These decisions will be recorded, and predictions of emissions will be refined and reflected in the “design principles” approach to scheme development, as outlined in Annex E8 (Design Principles). It is therefore envisaged that significant further carbon savings for the scheme will be achieved.
- 6.42. Scope 1 GHG emissions associated with users’ utilisation of the project assets (e.g. building lighting and heating, process emissions, etc.) will be considered in gate three.
- 6.43. It will be necessary, as a last resort, to offset some emissions to reach net zero for the scheme. It is recognised that carbon thinking will continue to evolve in the future, and that there is therefore a need to keep up with these developments and incorporate them into proposed carbon solutions. Offsetting opportunities will be explored for remaining emissions in gate three.

## 7. Programme and Planning

### Project Plan

#### Introduction

- 7.1. The project plan for GUC SRO is based upon scheme selection in the Regional Plan. In accordance with the draft WRSE Regional Plan published in Autumn 2022, a scheme DO of 50 Ml/d is required in 2031/32, with a potential requirement for a further 50 Ml/d by 2040 to 2050.
- 7.2. A scheme with a DO which exceeds 80 Ml/d is defined as a NSIP and must obtain development consent under a DCO. Publication of the final Regional Plan will determine the scheme’s direction in future gates.
- 7.3. The GUC SRO can be phased from 50 to 100 Ml/d DO. The estimated construction timeline for a 50 Ml/d scheme is four years, and a further phased 50 Ml/d is estimated to take an additional two years to construct. A shorter second-phase construction period is estimated because the required land will have been procured in phase 1, and civil works for many of the scheme elements will have been completed ready for the installation of mechanical equipment.
- 7.4. For commissioning of the GUC SRO, water will be required to be available from Minworth SRO. It is currently anticipated that flow from Minworth SRO will be available in Q1 2031. Flow commissioning will need to be sequential, from Minworth pumping

station at the start of the scheme to the pipeline transferring treated water to AfW customers at the end.

- 7.5. Performance tests at the treatment works are expected to take four months. Overall, there will be a period of up to 20 months from flow being available from Minworth SRO to providing a DO of 50 MI/d into supply.

## Key Activities and Outcomes

- 7.6. Key future activities and outcomes are summarised in Table 7.1 and illustrated in Figure 7-1. The GUC SRO and Minworth SRO will, wherever possible, align critical path activities to enable timely delivery of the DO requirements for the GUC SRO.

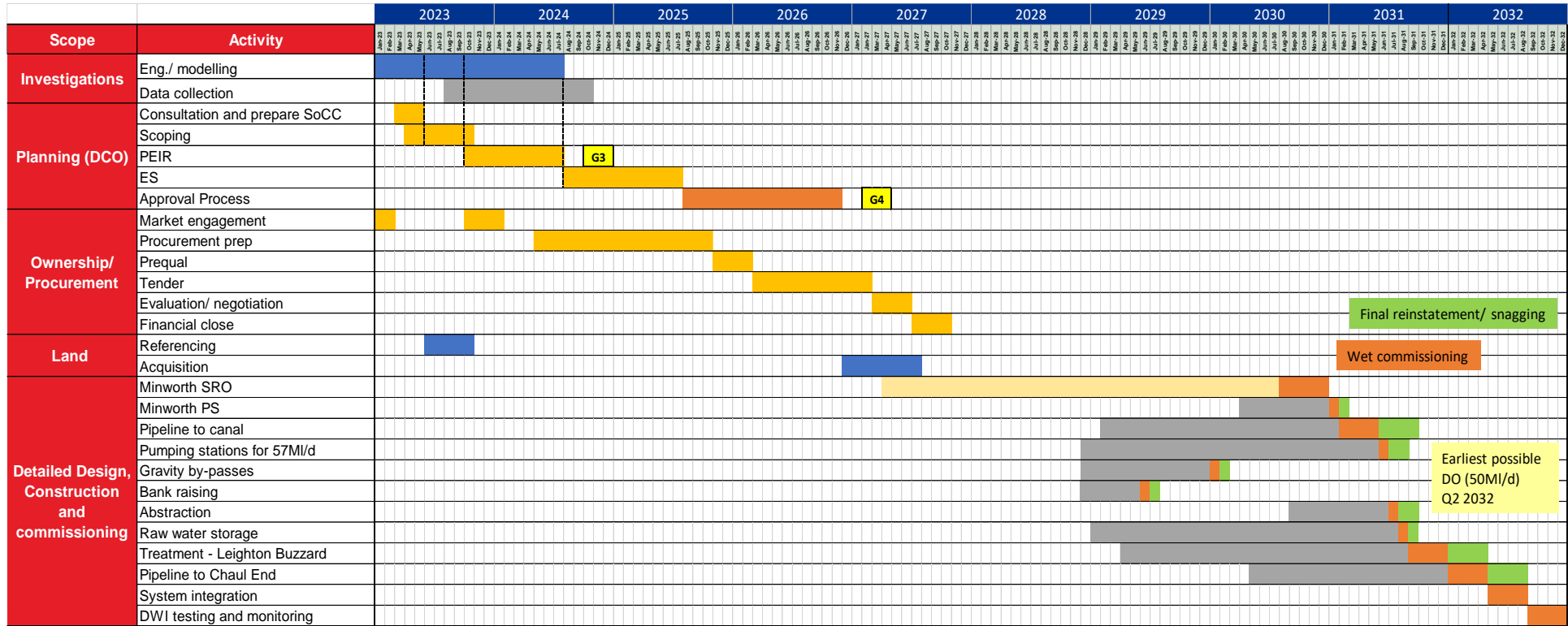
Table 7.1: Phases of future project delivery

Description	Timing	Key Activities	Decisions
<b>Gate two</b>	July 2021 – Nov 2022	<ul style="list-style-type: none"> <li>RAPID gate two submission - work included gathering environmental and water quality data, along with targeted topographical and hydrological data, in order to complete canal hydraulic and water quality modelling. From this, we identify the preferred options and scheme capacity, and prepare and cost the overall concept solution and designs.</li> </ul>	<ul style="list-style-type: none"> <li>RAPID gate one approval (December 2021)</li> <li>Draft Regional Plan (Autumn 2022)</li> </ul>
<b>Gate three</b>	Dec 2022 – Q3 2024	<ul style="list-style-type: none"> <li>Alignment of scheme need, timing and scale to final Water Resources Management Plan (WRMP)24 and Regional Plan (Winter 2023).</li> <li>Commence and complete engineering data collection and survey.</li> <li>Commence environmental baseline data collection and survey.</li> <li>Land referencing.</li> <li>Complete remaining options technical appraisal for key aspects of the project.</li> <li>Undertake non-statutory consultation(s) on options and initial preferred scheme.</li> <li>Develop EIA Scoping Report, submit to the Planning Inspectorate and receive formal EIA Scoping Opinion.</li> <li>Response to Scoping Opinion – seek clarity on issues raised (non-statutory consultation(s)) on options and initial preferred scheme.</li> <li>Draft, agree and publish Statement of Community Consultation (SoCC).</li> <li>Draft value-for-money assessment and DPC SOC, and submit for approval of Ofwat DPC Control Point B.</li> <li>Complete baseline data collection and survey.</li> <li>Preliminary Environmental Information Report (PEIR).</li> <li>Statutory consultation(s) on final scheme.</li> <li>Refine design and develop initial preferred scheme to reflect survey data collection and stakeholder feedback at consultation.</li> <li>Ongoing liaison and negotiation with affected landowners.</li> <li>Submission for RAPID gate three.</li> </ul>	<ul style="list-style-type: none"> <li>RAPID gate two approval (draft decision March 23, final June 23)</li> <li>Planning Inspectorate EIA Scoping Opinion</li> <li>Ofwat Control Point B - Strategic Outline Case (SOC).</li> </ul>



Description	Timing	Key Activities	Decisions
<b>Gate four</b>	Q4 2024 – Q1 2027	<ul style="list-style-type: none"> <li>Assemble formal EIA and Environmental Statement (ES).</li> <li>Create full DCO document suite.</li> <li>DCO submission to Planning Inspectorate, preparation, preliminary meeting and examination in public.</li> <li>Planning Inspector’s report to Secretary of State (SoS).</li> <li>Develop Procurement Plan, tender documents and outline business case, and submit for approval of Ofwat DPC Control Points C, D and E.</li> <li>Progress Pre-Qualification Questionnaire (PQQ) and Invitation to Tender (ITT) for procuring the Competitively Appointed Provider (CAP).</li> <li>Bidding.</li> <li>Submission for RAPID gate four.</li> </ul>	<ul style="list-style-type: none"> <li>Partner company approval to submit DCO application</li> <li>RAPID gate three approval</li> <li>Ofwat Control Point C (procurement plan)</li> <li>Ofwat Control Point D (tender documents)</li> <li>Ofwat Control Point E (outline business case)</li> <li>SoS’s award of DCO</li> </ul>
<b>Contract award</b>	Q1 2027 – Q4 2027	<ul style="list-style-type: none"> <li>Bid evaluations.</li> <li>Ongoing negotiations with preferred bidder(s).</li> <li>Final contract negotiations and CAP award.</li> <li>Preferred bidder and financial close.</li> <li>Submit final Business Case to Ofwat (as required for Ofwat Control Point F).</li> <li>Confirm securement of land control / acquisition.</li> </ul>	<ul style="list-style-type: none"> <li>RAPID gate four approval</li> <li>Contract award for delivery</li> <li>Land acquisition contracts</li> <li>Ofwat Control Point F (for DPC)</li> </ul>
<b>Construction</b>	Q4 2027 – Q4 2032	<ul style="list-style-type: none"> <li>Detailed design by CAP (or Design &amp; Build (D&amp;B) contractor for elements procured under this route).</li> <li>Construction lead-in and pre-mobilisation activities.</li> <li>Construction and commissioning 50 Ml/d.</li> </ul>	<ul style="list-style-type: none"> <li>Design approvals</li> <li>Final system testing</li> <li>Handover</li> </ul>

Figure 7-1: Project-level plan



## Key Dependencies and Assumptions

- 7.7. The need identified by the draft WRSE Regional Plan means that the scheme DO must be available in 2031/32, and the RAPID guidance states it must be construction ready in AMP8 (i.e. April 2025 to April 2030). The GUC SRO is on schedule to be construction ready by Q4 2027.
- 7.8. The timing of the solution and key activities are based upon a number of critical assumptions and dependencies, outlined in Tables 7.2 and 7.3.

Table 7.2: Assumptions

Assumption	Commentary
<b>Work in gate three</b>	We will proceed with gate three work immediately following gate two submission.
<b>Timely completion of Minworth SRO</b>	The GUC SRO is dependent upon Minworth SRO for supply. It is therefore assumed that the Minworth SRO will be completed in time to meet GUC SRO commissioning requirements.
<b>Improved connectivity in the AfW central region to unlock current network constraints</b>	AfW has developed a long-term strategy that allows for improved connectivity in the AfW central region. This includes a portfolio of new strategic internal transfers to move water more freely from further north and east within the region.
<b>GUC SRO will be classified as a NSIP</b>	It is assumed that GUC SRO will be classified as a NSIP and that all of the scheme will fall under the requirements of a DCO. To be classified as a NSIP, the DO must exceed 80 Ml/d.
<b>Limitation of the DCO</b>	Minworth WwTW will be included in the GUC SRO DCO as “associated development”.
<b>A published WRMP24 is required prior to formal DCO consultation</b>	It is assumed that a published WRMP24 is required prior to the commencement of formal DCO consultation, although pre-consultation studies and engagement would be commenced during the earlier stages of gate three.
<b>DCO timeline</b>	A timeline up to DCO award is expected to have a maximum duration of 45 months. No allowance is made for a period of judicial review.
<b>Baseline EIA survey data</b>	Additional baseline survey data (further to the data collected in gate two) to support the submission of an ES will be completed within 15 months.
<b>Contractual arrangements for construction</b>	It is assumed that the scheme is split into three works packages, delivered as follows: <ul style="list-style-type: none"> <li>• Minworth pumping station and pipeline to the canal at Atherstone – as part of Minworth SRO (in-house procurement D&amp;B).</li> <li>• Canal works, e.g. pumping stations and bank raising – by the Trust under contract to the CAP.</li> <li>• Abstraction from the canal, storage, treatment and pipeline to AfW network – CAP under DPC.</li> </ul>
<b>DPC qualifying for NSIP</b>	It is assumed that there is a route for DPC projects qualifying for NSIP as per the criteria set out in the 2008 Water Act (Section 28(1)(a)).

Assumption	Commentary
<b>DPC timeline</b>	An optimistic timeline up to financial close is expected to have a duration of 18 months, and a conservative timeline a duration of 24 months. The project programme is based upon a conservative timeline.
<b>DPC bid finalisation post DCO</b>	Three months allowed post decision for bids to be finalised.
<b>In-house procurement commencement</b>	In-house procurement commences once DCO application is accepted.
<b>Interaction between procurement and planning processes</b>	Bidders will be unwilling to prepare a bid without visibility of submitted planning applications. Bidders will be unwilling to submit final bids/prices on the basis of planning applications only, and will prefer to bid on the basis of planning determinations.
<b>Gate three submission date</b>	Following Statutory Consultation (public consultation, to satisfy the requirements of Sections 42 and 47 of the PA2008 and Regulation 11 of the Infrastructure Planning (EIA) Regulations 2017).
<b>Gate four submission date</b>	Following DCO approval and completion of pre-qualification and drafting of bid documents.

Table 7.3: Dependencies

Dependency	Commentary
<b>Regional Plan</b>	Our programme is dependent upon the final WRSE Regional Plan publication in Winter 2023, and upon the Regional Plan confirming the requirement of the GUC SRO.
<b>No environmental showstoppers</b>	Our work in gate two demonstrates that there is a complex interaction with the environment, and environmental data on the canal network is not as readily available as it is for rivers. We have not identified any showstoppers in gate two.
<b>Confirmation of the Minworth SRO in the Water Resources West (WRW) Regional Plan</b>	The Regional Plan will inform the statutory WRMP24, which in turn is expected to form the Statement of Need for the SRO during subsequent scheme promotion. The Regional Plan therefore needs to inform the preferred solution(s) within the SRO project.
<b>The scheme will be able to achieve the required consenting post gate two</b>	Despite gate two activities, the lack of historic environmental data on the canal system could raise a residual programme risk associated with the ability to achieve the required environmental consents post gate two.
<b>Required abstraction and discharge licences</b>	These will be obtained during early stages of construction by the appointed contractor and there will be no delay in approval or conditions which impact on the scheme’s ability to deliver the required DO.

## Planning and Consenting Route

- 7.9. A scheme with a DO exceeding 80 MI/d is defined as a NSIP and requires a DCO to authorise its construction and operation. The NSIP definition is predicated on the total DO for which consent is sought, provided that the project is designed for a DO over 80 MI/d in the final phase. It would remain an NSIP even if delivered in phases which individually do not reach the threshold. The DCO consenting route includes statutory timeframes for decisions and therefore offers the greatest prospect of timely project delivery.
- 7.10. Planning options for Minworth SRO are given in the Minworth SRO gate two submission, and consider either a Town and Country Planning Act (TCPA) planning application or associated development as part of the GUC SRO DCO application. Associated development is the preferred option; however, the option of TCPA will be considered, provided that a benefit to both schemes can be identified.
- 7.11. Our project team in gate three will include planning, EIA and land experts, as well as legal experts to guide effective and efficient processes and governance arrangements for delivering the planning and land acquisition processes.

## Pre-application and Application Preparation

- 7.12. A scoping opinion will be sought early in gate three from the SoS via the Planning Inspectorate to establish the information required in the ES to support the DCO submission. This will enable an EIA to be carried out and for necessary baseline survey data to be gathered. The scoping opinion will provide an opportunity to identify and assess key environmental impacts and issues of concern, facilitated through consultation with the Planning Inspectorate, statutory and non-statutory consultees, non-governmental organisations (NGOs) and the local community. The Planning Inspectorate has six weeks from the submission date to produce the scoping opinion.
- 7.13. Consultation by the project team will be ongoing throughout the pre-application and application preparation process, to ensure potential negative impacts are avoided or reduced, and to gain support for the proposed development. Promotion through the Local Plan reviews will assist in formalising clear insights on the local level of support for the proposed scheme. Topographical, geotechnical and contaminated land surveys will be initiated in gate three to support environmental assessment work and engineering design. Land referencing early in gate three will establish all landowners likely to be affected by the proposed scheme.
- 7.14. In gate three, we will prepare and publish a SoCC for the scheme, in accordance with Section 47 of the Planning Act 2008. The purpose of this document will be to explain clearly how we intend to consult with local communities and all those who will be affected by the project.
- 7.15. It is envisaged that the consultation strategy will be devised through discussions with the Planning Inspectorate, local authorities and community representatives. The SoCC will also provide an overview of the range of engagement activity to be undertaken informally and on a non-statutory basis during gates three and four. This is likely to include:
- Presentations and discussions with local communities and parish councils, including public presentations and meetings.
  - Briefings and discussions with other key consultees, including representatives of local authorities.

- A project website containing information about the proposals, including scheme proposals and other draft application material, and including contact details for people to comment on the proposals.
  - An extensive, but non-statutory, consultation at appropriate stages.
- 7.16. Statutory public consultation will follow the Planning Inspectorate's receipt of the PEIR.

## Land Strategy

- 7.17. Early in gate three, we will prepare land referencing and land access strategy for the entirety of the GUC SRO.
- 7.18. The northern section of the scheme, a 20km pipeline, is routed mostly through agricultural land and will transfer water from Minworth WwTW to the Coventry Canal at Atherstone and, via the Oxford Canal, into the GUC. Easement agreements will need to be negotiated and established to route the pipeline, with small areas of land acquired for a pressure-break tank along the pipeline route.
- 7.19. The middle section, the GUC, currently owned and managed by the Trust, would provide a water transfer conduit to AfW's supply area. Most of the construction work will be contained within land under the Trust's ownership.
- 7.20. In the southern section of the scheme, abstraction and treatment facilities will be provided along with a transfer pipeline to the AfW water distribution network at Chaul End SR. At the site for abstraction, approximately 4ha will need to be acquired for bankside storage, and approximately 7ha as a site for treatment. The connection from the canal to this area will require the installation of a pipe under the River Ouzel and will require an easement agreement. From the treatment works, an easement agreement will be required for the 18.8km rising main to transfer treated water to Chaul End SR.
- 7.21. Land referencing will consist of examination of sources of information from Land Registry and various data searches, in order to identify people with an interest in land, establish any areas of concern, and understand the number of ownerships and whether there are any obvious issues.
- 7.22. Agreements will be required with highway and rail authorities to route pipelines under their infrastructure.
- 7.23. A DCO can include powers of compulsory acquisition, which is particularly relevant for the GUC SRO where there are multiple land interests. Land acquisition and easement requirements will therefore be incorporated within the DCO application for the scheme.

## Engineering and Modelling

- 7.24. Engineering and modelling work will need to be sufficiently developed to describe the scheme for the purposes of the ES and draft DCO consent that will be submitted in support of the application. Design work will be based upon detailed surveys procured under gate three. This will enable site layouts to be developed, as well as basic general arrangement drawings for each scheme component, and site elevations produced for above-ground assets. It is envisaged that there will remain some flexibility for design development under an awarded DPC contract, to enable the contractors to ensure that optimum value-for-money solutions are built to the required standard within timeline constraints.

## Outline of Procurement Strategy

7.25. A CAP will undertake the works at the site for abstraction and treatment, and at the transfer to the AFW network. The CAP may also be best placed to be responsible for construction work on the canal, with the construction work being undertaken by its own contractors or by the Trust under a sub-contract agreement. The Trust will be required to operate completed works on the canal, in order to meet its obligation to all users of the canal network. The transfer to the canal at Atherstone will be funded by STW through PR24, along with work at Minworth WwTW required as part of the Minworth SRO. Any works undertaken by STW will be covered under the Bulk Supply Agreement (BSA) for the water resources, modified as required.

## Environmental Permitting

7.26. As outlined in Table 7.4, it is envisaged that a number of applications for environmental permits will need to be submitted, and approval obtained for work to be implemented. The discharge consent for treated effluent to the canal is likely to be obtained as part of the Minworth SRO.

Table 7.4: Regulatory consent requirements

No.	Consent Description	Commentary
1	Discharge treated effluent from Minworth to the canal	An environmental permit is required to discharge liquid effluent or wastewater to a canal.
2	Abstraction licence (from the canal)	An abstraction licence (permission to take water from a surface source, including a canal) will need to be obtained from the EA.
3	Flood risk activities (as a result of works and scheme operation on the canal)	An environmental permit is required for any work under, over or near a main river.
4	Liquid waste discharge from the water treatment works	An environmental permit is required for releasing polluting liquids to surface waterbodies such as a canal, stream or river.
5	Solid waste	An environmental permit is required for disposal of sludge from the water treatment works.
6	Various permits required as part of the scheme construction process	A number of permits will need to be obtained by the contractor engaged to implement the project.

## Key Risks and Mitigation Measures

### Regulatory Barriers

7.27. The gate two assessments have not identified any regulatory barriers to the scheme progression. Work in gate three will included a Local Development Framework policy review, as well as a review of draft and/or final National Policy Statements (NPS) and the National Planning Policy Framework.

## Programme Risk

- 7.28. There are a number of programme risks within the DCO and construction phases of project implementation. There are several factors that can influence how long the pre-application stage takes. We will focus on key opportunities to compress the timescales, which are summarised below:
- A comprehensive programme of early engagement with regulators and statutory consultees (including relevant local planning authorities and statutory environmental bodies).
  - Nurturing stakeholder relationships and resolving issues raised wherever possible, including making funding available to stakeholders to support this (e.g. via a Planning Performance Agreement with the local planning authorities).
  - Pre-scoping discussions with regulators for a good understanding of their expectations on the scope of the assessment, as well as any concerns.
  - A well-progressed design, environmental survey programme and early development of measures to be included in a Code of Construction Practice, enabling a more refined scoping report to be produced.
  - Early gathering of a comprehensive suite of baseline data to provide a robust basis for the assessment, minimising the risk of the pre-application programme being elongated.
  - Setting up efficient processes and governance structures to have regard to stakeholder feedback, and to make decisions on scheme changes well in advance of the end of each public consultation period. Note that the volume of consultation responses can also present a risk to the programme.
  - Early engagement with a suitably qualified advisor for land referencing, minimising the risk of the land referencing process dictating or elongating the programme.

## Data to Support Preparation of Environmental Statement in Gate Three

- 7.29. The ES will need to set out the data required to identify and assess the main effects the scheme is likely to have on the environment. The scoping report will provide information on the proposed coverage of the EIA, including any uncertainties that have been identified. In response to the scoping report, the Planning Inspectorate will decide upon the scope of the assessment required, and this will determine the duration of further surveys.
- 7.30. The scoping checklist (see Annex B3.3.5 (Environmental Appraisal Report) for complete list) developed from our gate two environmental assessments identified the following additional environmental survey requirements, which we envisage can be completed within a 12-month period:
- Heritage assessment (as part of the EIA) may identify requirements for archaeological investigations or site surveys of heritage features.
  - Site surveys will be required for the Landscape and Visual Impact Assessment, as part of the EIA.
  - Walkover surveys of the pipeline route and overall scheme area, to determine requirements for targeted protected species surveys.
  - eFishing and eDNA surveys.
  - Further field surveys to capture full range of INNS present along the transfer route and within hydraulically connected waterbodies.
  - BNG baseline surveys.



- Contaminated land risk assessment (as part of the EIA) may identify requirements for land quality testing.
  - Baseline noise surveys as required to inform the EIA.
- 7.31. In addition to the above, a description of the aspects of the environment likely to be significantly affected by the development, including population, fauna, flora, soil, water, air, climatic factors, material assets, the architectural and archaeological heritage, landscape and the interrelationship between the above factors will be included.
- 7.32. Water quality sampling and analysis will continue throughout gate three in order to continue to collect baseline information to support the existing status of the canal. This data will be used to ensure that the scheme does not cause deterioration, and that it maintains or improves the canal water quality, so that the water transferred along the canal for AfW customers can be treated to provide a wholesome drinking water supply.

### Project Risk

- 7.33. The risk scoring referenced in this section is completed based on the definitions given in Figure 7-2.

Figure 7-2: Risk score matrix

		Probability of risk occurring				
		1	2	3	4	5
Impact of risk occurring	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5

- 7.34. A summary of the most important risks to the project is shown in Table 7.5. This information is consistent with that shared previously with RAPID.

Table 7.5: Key risks

Ref	Short description	Category	Detailed description	Original risk score	Plan to manage	Mitigated risk score
1	Minworth WwTW discharge parameter uncertainty	Engineering	Uncertainty around the Minworth cost is driven by uncertainty in interpretation of the environmental regulations/policy for discharge into the canal.	25	We are working closely with the EA to resolve this uncertainty. Through regional modelling, it has been established that the GUC SRO is still being selected at higher treatment costs.	12
2	Pollution occurrence in canal	Engineering	Leading to financial, reputational, and/or environmental consequences, and potentially being unable to utilise GUC transfer.	20	Integrated design to prevent increased risk of pollution, early warning system required. Treatment process to be robust enough for all events. Storage facilities at treatment site.	6
3	Stakeholder engagement with NE	Stakeholder	Insufficient engagement from key stakeholder prior to submission of gate two paper, due to limited resource to support SRO development.	20	Work with NAU to escalate for resolution and improved NE engagement for gate three (early 2023).	12
4	Emerging contaminants and viruses	Environmental	Gate two solution guidance requires details of proposed mitigation for any emerging contaminants identified. There is currently limited monitoring and analysis of emerging substances.	20	The outcome of an emerging substances risk review has established the scope of additional monitoring and analysis, which has been initiated in September 2022.	5
5	Sediment mobilisation	Environmental	There is potential for increased flows in the GUC to cause mobilisation and transport of sediment from the base of the canal.	16	Investigations in gate two concluded that consolidated bed sediments will not be mobilised. We will carry out further investigation in gate three into the chemical content of weak uppermost deposits and their potential for mobilisation.	8
6	INNS movement	Environmental	Potential for increased movement of INNS from the north section of canal, due to increased flow.	15	We are monitoring to understand the current prevalence of INNS, and carry out pathway-based risk assessment. The findings from this work will be used to propose ways of reducing the potential for INNS movement.	8

Ref	Short description	Category	Detailed description	Original risk score	Plan to manage	Mitigated risk score
7	Commercial agreement between solution owners	Commercial	Solution owners will need to agree commercial contracts to cover the supply of raw water from Minworth SRO and utilisation of the Trust's assets for water transfer.	15	Risk to be resolved in gate three via collaborative liaison between solution owners, to draft and agree appropriate contractual terms and conditions.	10
8	Regional Plan reconciliation / alignment	Planning	Risk that the Regional Plans will not align, and that a difference will exist in the selection of SROs across the Regional Plans.	12	Active engagement at monthly water regional group to better understand the regional reconciliation process between draft publication in Autumn 2022, and the final publication in Winter 2023.	8
9	Public Inquiry into the WRMP24 (which may delay formal case of need)	Other	If the WRMP is not signed off in accordance with current assumed timelines due to a Public Inquiry, this may delay the delivery of the GUC SRO.	15	The outcome of a public inquiry is to be expected before a DCO application is made for the scheme. Gate three work will therefore continue to programme. In event of an inquiry, AfW would seek approval of their case of need from the SoS to keep GUC SRO on programme.	5

## Proposed Gate Activities and Timelines

7.35. Key gate activities and timelines are outlined in Table 7.6.

Table 7.6: Proposed activities and timelines

Item	Activity	Timeline
1	Confirm key planning advice appointment for progressing planning	Winter 2022
2	Determine work packages for gate three, scope and procure	Winter 2022
3	Progress solution design to a level sufficient for scoping, PEIR and ES	Early 23 – Summer 24
4	Topographical and geotechnical surveys	Early 23 – Summer 23
5	Land referencing, planning for land acquisition and easement agreements	Early 2023
6	Prepare EIA scoping report and submit	Spring 2023
7	SoCC	Spring 2023
8	Non-statutory consultation	Early 2023
9	Market consultation (procurement)	Spring 2023
10	Confirm EIA scoping requirements (Planning Inspectorate)	Winter 2023
11	Alignment of scheme need, timing and scale to WRMP24	Late Winter 2023
12	Control Point B – preparation and submission of a SOC	Spring 2024
13	Gate three submission	Late Summer 2024
14	Collect survey data for EIS	Summer 23 – Winter 24
15	Prepare PEIR	Winter 23 – Spring 24
16	Statutory consultation	Spring 2024
18	Control Point C – preparation and submission of procurement plan	Winter 2024
19	Prepare ES and DCO submission	Summer 24 – Summer 25
20	Submit application	Summer 2025
21	DCO examination	Winter 25 – Summer 26
22	DCO decision	Early 2027
23	Prepare prequalification documents, invite applicants and evaluate	Winter 25 – Early 26
24	Land acquisition and establishment of easement agreements	Winter 25 – Spring 26
25	Control Point D – preparation and submission of tender documentation	Summer 25
26	ITT	Summer 25 – Spring 26
27	Tender evaluation	Summer 2026
28	Gate four submission	Summer 2026
29	Preferred bidder and financial close	Winter 26 – Spring 27
31	Liaison with EA and NE via NAU	Ongoing throughout
32	Liaison for Minworth SRO progress in parallel	Ongoing throughout
33	Control Point E – preparation and submission of Outline Business Case	Winter 2025
34	Control Point F – preparation and submission of Final Business Case	Autumn 2027
35	Financial close and award	Winter 2027

## Procurement, Ownership and Operation

### Assessment for DPC

- 7.36. At gate one, the GUC SRO as a whole was assessed as unsuitable for DPC based on concerns around discreteness, in particular the works that would have to be undertaken on the canals owned and operated by the Trust.
- 7.37. In gate two, we have updated the DPC analysis based on Ofwat guidance<sup>6</sup>, including revised size and discreteness tests, and a new value-for-money test using the cost data now available. Should the Ofwat guidance develop further in the future, we will look to redo the suitability assessment. The tests have been run for the scheme as a whole and sections of the scheme, comprising:
- Transfer from the Minworth WwTW (post treatment) to the discharge point into the canal at Atherstone (Atherstone Transfer).
  - Enhancement works on the canal network from Atherstone to the abstraction point at Leighton Buzzard.
  - Transfer from the abstraction point at Leighton Buzzard through to a connection point into the AfW network at Chaul End SR, including storage and treatment (the Southern Assets).
- 7.38. There are two potential sizes for the GUC SRO, 57 Ml/d and 115 Ml/d, but these do not change the results of the DPC assessment.
- 7.39. Table 7.7 summarises the results of the assessment for DPC.

Table 7.7: Results of the assessment for DPC

Option	Test 1: Size	Test 2: Discreteness	Test 3: Value for Money	Result: Suitability for DPC
<b>Whole scheme</b>	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
<b>Whole scheme excluding the canal</b>	Suitable for DPC	Not suitable for DPC	Suitable for DPC	Not suitable for DPC based on discreteness
<b>Southern Assets from the abstraction point</b>	Suitable for DPC	Suitable for DPC	Suitable for DPC	Suitable for DPC
<b>Atherstone Transfer</b>	Not suitable for DPC	Suitable for DPC	Suitable for DPC	Not suitable for DPC based on size

- 7.40. The scheme as a whole passes both the size and value-for-money tests, but it is considered unsuitable for DPC based on the discreteness test. This finding is driven by the nature of the works on the canal section, where significant modifications are required to existing assets, and the network will need to be maintained and operated in a way that is consistent with the Trust’s obligations to other users of the waterways. We have therefore considered the suitability of sections that do not require canal works.
- 7.41. Excluding the canal from the DPC assessment does not mean the scheme becomes suitable for DPC, as it creates two geographically separate sites for a third party to own

<sup>6</sup> Ofwat, Delivering Water 2020: Our methodology for the 2019 price review, Appendix 9: Direct procurement for customers (December 2017)

and operate. This is likely to add complexity to construction and operation, and potentially doubles the number of interfaces that need to be managed.

- 7.42. Considering the assets at either end of the canal, the Southern Assets are, based on current inputs, suitable for DPC. The assets are relatively self-contained, with limited interfaces with existing infrastructure. The Atherstone Transfer passes both the discreteness and value-for-money tests, but it is considered unsuitable based on size, with a maximum TOTEX of approximately £80m.

## Delivery Parties

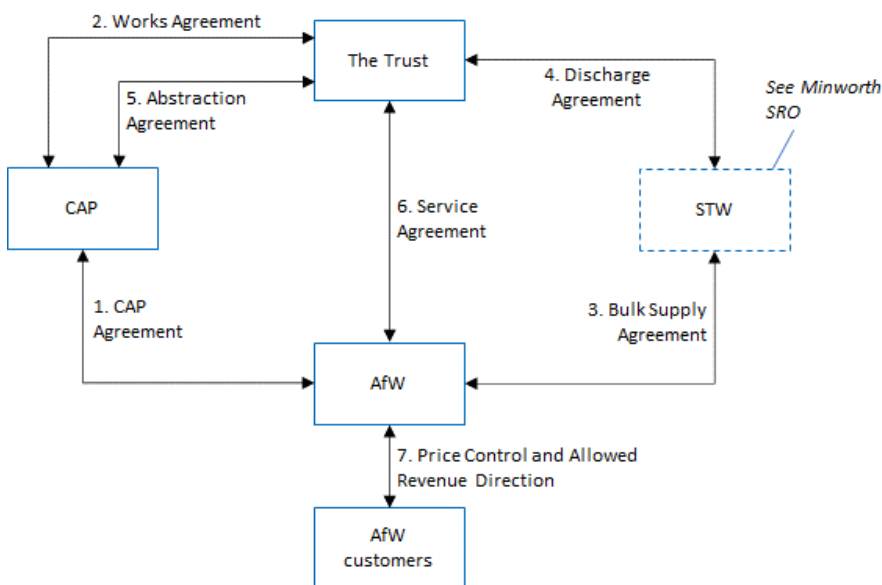
- 7.43. Based on the results of the DPC assessment, we propose the following parties deliver each element of the scheme:
- **Atherstone Transfer:** Given its size and interface with the Minworth WwTW, the delivery of the works should be considered alongside the delivery of assets comprising the Minworth SRO, and is best delivered by STW through a D&B contract, as part of the Minworth WwTW expansion to supply the GUC SRO.
  - **Southern Assets:** With the Southern Assets suitable for DPC, we considered the appropriate CAP contract counterparty. These included the Provider of the water resource, the Beneficiary of the water resource, and a Joint Venture of the two. As the Southern Assets only connect into the Beneficiary network and do not rely on the Provider for any enabling works or other support, we consider AfW, as the Beneficiary, the most appropriate contract counterparty.
  - We went on to consider whether there was a case for applying the Specified Infrastructure Projects Regulations (SIPR) to protect AfW from the size and complexity of the project by moving the third party into a separately licensed entity, as per the Thames Tideway Tunnel (TTT). Based on the scale of the works, including the canal works (see below), there does not appear to be a need for applying SIPR in this instance. This will be kept under review.
  - **Canal enhancement works:** While the Trust will be required to operate the assets in order to meet its obligations to all users of the canal network, it may not be best placed to finance the construction works. As the CAP is specifically established to raise competitive finance, it may be better placed to fund the works. The CAP may also be best placed to undertake the works using its own contractors, which would help in coordinating completion and ensure appropriate liquidated damages are available in the event of a delay. Such an arrangement would need to be tested through market engagement.

## Contractual and Operational Arrangements

- 7.44. Below (and in Figure 7-3) is an indicative contractual arrangement based on the delivery parties identified above. The principal purpose of each contract would be:
- **CAP Agreement:** Sets out the services the CAP will deliver, and the basis on which they will be paid. The payment amount will be based on the bid during the competitive procurement process. Should the CAP be undertaking the construction work on the canal, the payment will be sized to include any associated funding costs.
  - **Works Agreement:** To allow the CAP to undertake work on canal assets, it will require the Trust to provide access, approve work risk assessments and method

- statements, and provide permits to work. The agreement would also set out the basis on which the assets are transferred to the Trust on completion.
- **Bulk Supply Agreement:** Any BSA between AfW and STW could be modified to include the provision of the capacity at Minworth WwTW and the Atherstone Transfer, alongside any payment for the water resource.
  - **Discharge Agreement:** Provision for STW to discharge water into the canal network, subject to the Trust’s operational requirements, including coordination with the CAP’s Abstraction Agreement.
  - **Abstraction Agreement:** Provision for the CAP to abstract water from the canal network, subject to the Trust’s operational requirements, including coordination with STW’s Discharge Agreement.
  - **Service Agreement:** Sets out the service the Trust will provide once it receives the assets from the CAP and the basis on which it will be paid (for the operation and maintenance, as the construction cost is recovered under the CAP Agreement).
  - **Price Control and Allowed Revenue Direction:** AfW would look to recover all the costs of the scheme from customers. While certain costs may be recoverable through the standard price control, other cost (in particular the CAP costs) would be recovered under an Allowed Revenue Direction granted by Ofwat.

Figure 7-3: Indicative contract structure



- 7.45. Operation of the scheme as a whole may be through a number of alternative arrangements: for example, bilateral communication between each party as required, or a System Operator relaying instructions to all parties.
- 7.46. While a system of bilateral communications may work in most eventualities, there is a concern as to how it would respond to disruptions in any part of the chain: for example, a temporary restriction on abstraction or discharge, or the Minworth WwTW output being unable to match AfW’s demand. Where instructions cannot be followed or need to be modified, a central clearing house or System Operator may be required.

## DPC Tender Model

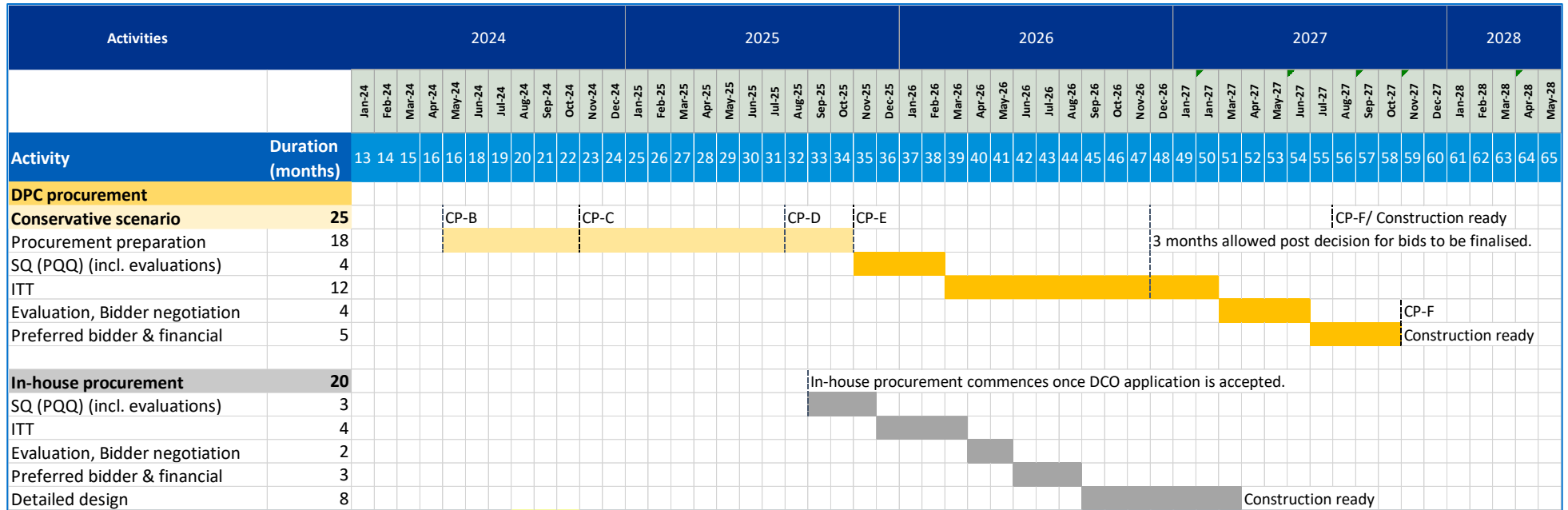
- 7.47. For the Southern Assets, which would be procured via DPC, we have considered the appropriate tender model in appointing the CAP. Potential alternatives include:
- **Early model:** Schemes will be tendered out once the preferred solutions have been identified by incumbent companies. The tender and handover of assets will be at the “initial solution design” stage.
  - **Late model:** Schemes will be tendered out after incumbent companies have obtained consent and initial design has been completed. The tender and handover of assets will be at the “detailed design of assets” stage.
  - **Split model:** Schemes will be tendered out in two separate tenders: one for the design, and another for the construction and operation of the asset. Under this model, there will be two handover points, one at the “initial solution design” stage and the second at the “detailed design of assets” stage.
  - **Separation of construction and financing:** Following the example of TTT, the separate procurement of the construction contractor and the project company that will finance and own the asset. This could be considered a bespoke version of the late model (above).
- 7.48. Based on consideration of the examples where the alternative tender models have been applied or are in development (including Offshore Transmission Owners, Competitively Appointed Transmission Owners, Private Finance Initiative, Public Private Partnership, and TTT), we consider the late model to be the most appropriate for the Southern Assets.
- 7.49. The early model could mean significant cost uncertainty at the time of appointment, and the split model could add significant lead times with two procurements. Separating the finance and construction may mean that bidders are unable to optimise the risk allocation between contractors and the CAP. The late model can be aligned to the DCO and TCPA planning application timelines, as well as providing additional benefits to customers in the form of fixed prices for the contract duration.
- 7.50. Figure 7-4 sets out indicative procurement timelines for the DPC and D&B contracts. The DPC timeline includes the timing of control points, and both an “optimistic” and “conservative” timeframe for the process from tender launch to be established from market engagement. An optimistic timeline up to financial close is expected to have a duration of 18 months, and a conservative timeline a duration of 24 months. The project programme is based upon a conservative timeline. For both procurement options a period is expected to be required before financial close for bidders to examine the detail of the DCO approval and, if required, modify their bids accordingly.

## Market Engagement

- 7.51. Market engagement will be undertaken early in gate three, focusing on:
- Market appetite for the Southern Assets as a DPC project.
  - Market appetite for a Southern Assets CAP to finance and undertake works on the canal assets.
  - CAP Agreement risk allocation principles, including payment mechanism and termination provisions, etc.
  - Testing of the proposed late tender model and procurement timeline.



Figure 7-4: Indicative procurement timeline (conservative scenario)



## 8. Solution Costs and Benefits

8.1. This section outlines the costs and benefits of the proposed GUC SRO. The cost estimates prepared for the scheme at gate two used the ACWG methodology and relevant green book guidance. They therefore contain a standardised optimism bias (OB) that will reduce as we gain more certainty through the gates. Detailed costing is given in Annex E7 (Cost Profile – WRMP Table 5) and presents the cost profile information.

### Comparison of Options

- 8.2. Tables 8.1 and 8.2 give net present value (NPV) summaries for the flow transfer and treatment options respectively for 57 MI/d and 115 MI/d schemes. Costing for option selection has been based upon cost curve data. All figures are rounded to the nearest multiple of 10. These figures exclude third-party OPEX prices for Minworth WwTW source water and the Trust’s assets.
- 8.3. Engineering and design assumptions are given in Annex A1 (Engineering CDR).
- 8.4. The lowest overall cost for transfer is route 3, a transfer pipeline from Minworth WwTW to the canal at Atherstone.
- 8.5. The lowest overall cost for abstraction, treatment and transfer is for a site at Leighton Buzzard, with a transfer pipeline to Chaul End SR.

Table 8.1: Comparison of options – Transfer route selection

Description	Units	Route 1 <sup>7</sup>		Route 3		Route 6	
<b>Option</b>	MI/d	57	115	57	115	57	115
<b>CAPEX</b>	£ (million)	160	250	100	180	290	350
<b>OPEX<sup>8</sup></b>	£ (million)	300	320	230	480	670	830
<b>NPV*</b>	£ (million)	230	330	160	290	420	540

\*OB not included given costs presented are for a component of the full SRO.

Table 8.2: Comparison of options – Site for abstraction, treatment and transfer

Description	Units	Leighton Buzzard		Tring		The Grove		Hemel	
<b>Option</b>	MI/d	57	115	57	115	57	115	57	115
<b>CAPEX</b>	£ (million)	90	140	110	160	120	180	110	160
<b>OPEX</b>	£ (million)	540	680	570	1020	610	1160	580	1070
<b>NPV*</b>	£ (million)	230	310	260	430	280	490	260	440

\*OB not included given costs presented are for a component of the full SRO.

<sup>7</sup> Route 1 is a canal-based option and has a small OPEX increase from 57 MI/d to 115 MI/d, because flow is lifted over a lower head compared to routes 3 and 6, which are pipeline options.

<sup>8</sup> OPEX calculated over an 80-year period.

## Selected Option

- 8.6. The cost of construction and operation for different phased approaches to the selected option (route 3 transfer plus Leighton Buzzard site) is given in the tables below<sup>9</sup>.
- Table 8.3 highlights an option to construct the scheme to 115 Ml/d immediately.
  - Table 8.4 offers costs reflective of an option constructed in phases, whereby phase 1 includes full construction of civil works, land and buildings to enable 115 Ml/d capacity and the M&E is installed to support a 57 Ml/d transfer. Phase 2 involves the upgrade of the Phase 1 M&E to increase the ability of the transfer to provide the full 115 Ml/d.
  - Finally, Table 8.5 presents costs associated with building a 57 Ml/d scheme in full, and then returning to construct a second 57 Ml/d scheme as a second phase.
- 8.7. Whilst Tables 8.1 and 8.2 use cost curves to generate option costs, the preferred option has been re-costed in more detail using bills of quantities for concept designs. This highlights a refinement in costs from the two tables above which generated a preferred option CAPEX of £320m (Route 3 + Leighton Buzzard, 115 Ml/d), in comparison to the CAPEX value shown in Table 8.3 and in Annex A1 (Engineering CDR).

Table 8.3: Cost of construction and whole-life operation (full capacity construction with flow ramp-up in 2040)

Scheme	CAPEX (£m)	CAPEX OB (£m)	OPEX (£m)	NPV (£m)
<b>Full capacity</b>	340	60	1,170	610

Table 8.4: Cost of construction and whole-life operation (phased scheme construction for full capacity by 2040)

Scheme	CAPEX (£m)	CAPEX OB (£m)	OPEX (£m)	NPV (£m)
<b>Phased M&amp;E</b>	340	60	1,150	590

Table 8.5: Cost of construction and whole-life operation (phased construction in 2 x 57 Ml/d capacity)

Scheme	CAPEX (£m)	CAPEX OB (£m)	OPEX (£m)	NPV (£m)
<b>Phased civil and M&amp;E</b>	450	90	1,260	690

- 8.8. With regard to the scalability of this scheme, we provided WRSE with multiple costed options, including a phased option to build in two parts. The regional model then has the ability to select the best value version of this SRO. The trigger point for WRSE in its draft Regional Plan is the success of demand management. If demand management targets are met, the GUC is required in a phased approach. If they are not met, the 115Ml/d version of GUC is likely to be required in a single phase.
- 8.9. Major maintenance requirements are given in Table 8.6. The design life for scheme components is in accordance with the WRSE asset life guide and is outlined in Annex A1.11 (Cost and Carbon Assessment).

<sup>9</sup> The NPC values presented are different to those in the Annex A1 and A1.11 following a change in methodology for the application of OB.

Table 8.6: Major maintenance requirements by scheme elements

Component	Element	Major maintenance requirements
<b>Transfer</b>	Pumping station	Pump replacement
	Minworth to Atherstone	Pipe cleaning
	Break tank	Desilting
	Discharge	Network connection
<b>GUC Canal Works</b>	Pumping stations	Pump replacement
	Pipelines and weirs	Weed clearance
	Raising and widening	Dredging
<b>Abstraction and Treatment</b>	Abstraction	Desilting
	Storage	Reservoir inspections
	Treatment	Media renewal
	Chaul End SR transfer	DWI inspection of SR

## Best Value Assessment and Solution Benefits

8.10. The comparative assessment of options, detailed in Annexes A1.1 (Abstraction Site Selection) and A1.2 (Transfer Route Selection), has been qualitative, and has considered a breadth of factors during construction and/or operation to allow differentiation between options. These factors are summarised below:

- **Engineering and design:** Potential to minimise material uses, hydraulic efficiency, construction risks and constructability issues, relative resilience to climate change, and the ability to accommodate mitigation measures.
- **Environmental impact:** Relative potential risk to sites with environmental and/or heritage designations, relative embedded and operational carbon for each alternative, and flood risk.
- **Social impact:** Impact and disruption to local communities, impacts on users of the canal network, and impacts on non-motorised users such as walkers, cyclists and equestrians.
- **Cost:** A comparison between the relative estimated costs for the alternative options.
- **Programme:** A comparison between how each of the alternative option might impact on the programme, considering their relative ease of construction
- **Value:** An initial review of opportunities to provide potential wider environmental and social benefits, considering how opportunities could align with national and regional policies and strategies.

8.11. Resilience metrics used to evaluate the scheme in the WRSE Regional Plan include reliability (the ability of the system to continue to provide its service in the face of shock events), adaptability (the ability of the system to adapt the way it delivers its service in the face of shock events, and to recover following unexpected system failure) and evolvability (the ability of the system to modify structure or function to cope with long-term stresses or trends). The purpose of these metrics is to ensure the plan is resilient to future shocks and stresses, and sit within the wider best value decision-making framework. Table 8.7 gives a summary of the resilience metrics used to evaluate solutions within the Regional Plan.

Table 8.7: Summary of resilience metrics applied to the GUC SRO for evaluation within the WRSE Regional Plan

Resilience Metric	Sub-metric	Comment/ description	Value <sup>10</sup>	Scoring range
<b>Reliability</b>	Supply-demand benefit uncertainty	The source water is resilient because it uses enhanced treated wastewater.	4	1 to 5
	Vulnerability to other hazards	Long-existing open infrastructure which is operable for navigation and other uses, may be vulnerable to hazards.	2	1 to 5
	Catchment / raw water quality risks	The risk of pollution in the canal is comparable to a typical river abstraction.	0	-2 to +2
	Risk of failure due to exceptional shocks	The treatment processes at Minworth WwTW are not complex. Backup power at pumping stations. The need to pump up Tring flight has been eliminated.	3	1 to 5
<b>Adaptability</b>	Operational complexity	Greater storage at water treatment works site allows for mitigation of complex operational issues.	2	1 to 5
<b>Evolvability</b>	Scalability and modularity	The scheme is able to upscale from the 50 Ml/d option, which is an advantage to the scheme. It is less able to upscale from the 100 Ml/d option, but still feasible.	4	1 to 5
	Reliance on external bodies	Initial consultation has taken place with canal community and users, and there is no known opposition. There will be complexity with contracts for construction and operation owing to existing asset.	2	1 to 5

## Customer benefits

- 8.12. The recommended treatment train is conservative in nature, with several layers of treatment to deliver a secure and wholesome supply of water.
- 8.13. The major positive resilience effects are identified in respect to climate change adaptation, as this scheme supports the provision of additional water resource to AfW. The scheme will assist the reliable transfer of water, reducing vulnerability and improving resilience to drought risks associated with climate change. This enhances AfW’s resilience not only to drought events, but also to operational issues such as pollution or major outages, given this will be a new strategic import to the region.
- 8.14. The scheme reuses existing canal assets and therefore minimises construction and use of new materials, as well as delivering at a cost that is acceptable to customers.

## Environmental benefits

- 8.15. There are opportunities at many locations along the canal to provide wider benefit to the environment, local communities and canal user groups. Advantage could be taken of remediation and upgrading work along the route to improve interaction between the canal and the wider environment, such as:
- Additional wetland habitats that enhance the environment and provide operational benefit to the scheme (e.g. around managing surge flows and weir discharges).

<sup>10</sup> Note: low score = notably less resilient; high score = notably more resilient.

These have the potential to provide flood alleviation, habitat creation, the introduction of rare plants and reedbeds, and realignment of the river channel.

- Protection and restoration of priority habitats (existing habitats of principal importance) and mitigation of carbon impacts, such as a series of wetland ponds, open mosaic habitats, living boundary wall and buffer planting, reedbeds, bird and bat boxes, and public access creation.

8.16. The solution aims primarily to replace groundwater abstraction from sensitive chalk aquifers within AfW's central region that feed into chalk streams which are vulnerable to climate change.

### Societal benefits

- 8.17. There are opportunities at some locations to improve the functioning of the canal for boat users and other canal users.
- 8.18. Significant, long-term benefits of the scheme include the cleaning up and reuse of a valuable resource in the Minworth WwTW effluent, improvement of the water quality in the canal due to the injection of high-quality water and the resulting increased velocity and oxygenation, and the reuse and upgrades to the existing GUC, which will extend the life and improve performance of this valuable heritage asset.

## 9. Stakeholder and Customer Engagement

### Our Approach

- 9.1. We developed our approach to engagement in line with RAPID's guidance for gate two (August 2022). We have built on the foundation of stakeholder and customer feedback received prior to gate one, activity completed through gate one, the representations made to RAPID at gate one, and direct feedback from RAPID and other regulators.
- 9.2. To ensure clarity, consistency and efficiency of the engagement activity with our customers and stakeholders, we have coordinated the engagement regarding SROs with that on Regional Plans, company WRMPs and company 2024 price review (PR24) Business Plan submissions. This approach to customer and stakeholder engagement activities has ensured there is a flow of insight through the process, as illustrated in Figure 9-1.

Figure 9-1: Insight flow from customer and stakeholder engagement



- 9.3. We are committed to working openly and transparently, and have sought to achieve this by:
- Sharing information and providing regular updates to stakeholders on the programme of work and the studies underway, giving them the opportunity to comment.
  - Working with regulators and stakeholders as part of the technical working groups to jointly define the scopes of work and technical methods, and to provide the outputs for technical assessments for review and challenge at an early stage of work.
  - Engaging with stakeholder organisations with specialist technical knowledge or a specific interest, to share relevant information and provide opportunities to input to the work.
  - Engaging with a wide range of stakeholder organisations to develop the plan for our long-term future water supply and the potential solutions at a formative stage of development of the plan, listening to feedback and taking it into consideration.

- Raising awareness around the challenge for water resources, the planning process and opportunities to shape long-term plans at a formative stage.

## Engaging Stakeholders

- 9.4. The engagement approach through gate two has three main parts:
- Activity to inform the development of the WRSE Regional Plan to ensure stakeholders understand how the GUC SRO, and other SROs, fit within the strategic planning framework.
  - Engagement with regulators and strategic stakeholders on the scheme itself to inform the feasibility assessments and conceptual design of the scheme.
  - Early engagement more locally: engaging the neighbouring local authorities along the canal, engaging Historic England and Highways England, and beginning to build a relationship with canal users.

## Regional Engagement

- 9.5. WRSE consulted extensively on its Regional Plan. Overall, over 1,150 written responses were received to the WRSE consultation and a response document<sup>11</sup> was published in May 2022, which provided a summary of the consultation responses, highlighted the main themes and issues raised, and outlined WRSE's consideration of the points and resultant action. The main concerns raised in relation to GUC SRO focused on:
- **Water quality:** The DWI highlighted water quality risks and issues associated with raw and potable transfer options. For raw transfers, upstream risks were highlighted, including whether mitigation is required at the receiving location. For both raw and potable transfers, the DWI raised the risk of associated changes to taste or feel, existing and emerging contaminants, and potential network impacts from corrosivity.
  - **Infrastructure:** The Trust emphasised the role of its infrastructure in transfer options into the region, such as the Severn to Thames Transfer (STT) SRO and GUC SRO.
  - **Efficiency:** NE advised caution around relying on transfers/imports from other regions, especially as they have their own environmental constraints. It advocated every effort being taken to minimise reliance on water from other regions, and to use the water resources within the region more efficiently.
  - **Resilience:** Questions were raised about the long-term resilience of transfer options. Stakeholders expressed concern that environmentally damaging options might be required in a source area to enable supplies to continue to be transferred to another area, and the acceptability of this was questioned. They also expressed concern about the financial and environmental costs of pumping water long distances, with some respondents considering that long-distance pipelines and transfers should be avoided.
  - **Carbon:** The lack of detailed information about the carbon impacts of proposed transfers was highlighted, and stakeholders requested details of how this would be mitigated and/or offset, and the cost of doing so. Stakeholders requested the publication of information to enable the whole-life embodied and operational carbon emissions of individual options to be understood.

<sup>11</sup> Draft WRSE Regional Plan: Consultation Response Document, May 2022



- **INNS:** The difference between raw and potable transfers was highlighted, with the risks of INNS, water chemistry and pathogens from raw water transfers noted as specific concerns.

## SRO-focused Engagement

- 9.6. Our engagement has been embedded throughout gate two, building on the gate one engagement with regulators and strategic stakeholders. It comprises meetings with regulators, the establishment of topic-specific technical working groups, one-to-one sessions, and activity to support WRSE and wider company engagement. The outputs and review comments have been used to shape the scope, assessment and initial mitigation measures developed for the preferred option at gate two.
- 9.7. Quarterly update meetings have been held with RAPID to discuss the programme outputs, risks and issues. We have also hosted a visit along the canal route for RAPID and other interested stakeholders to help visualise the scheme.
- 9.8. Five technical working groups have been set up to enable collaborative working with regulators and stakeholders with specialist knowledge or a defined stake in the topic. The activity has included sharing data, discussion and agreement on the scope of work and methodologies for technical assessment, and review and challenge of outputs.
- 9.9. We have also carried out one-to-one specialist engagement, including:
- Two workshops with the Canal Users Group (January 2022 and July 2022), a group of representatives of the different users of the GUC, such as boating, fishing, canoeing and wider environmental groups. We explained the work underway, heard their concerns, and set out the further activities and plans for engagement.
  - Two key planning-led workshops (December 2021 and July 2022), including all the local authorities along the route and at the potential treatment works site, Historic England, and National Highways. At the workshop, we shared the screening methodologies used to shortlist route options, and explored participants' concerns.

## Wider Company Engagement

- 9.10. AfW continues to host (jointly with Thames Water) a regular Water Resources Forum, open to all interested stakeholder organisations. The purpose of the Forum is to update stakeholders on the development of the Regional Plan and company WRMP24s, and to share information at a formative stage to enable stakeholders to participate in the process. Three Forums were held during gate two, in November 2021, February 2022, and June 2022.

## Engaging Customers











- 9.11. We have worked collaboratively with several other water companies to ensure a consistent and efficient programme of customer engagement that supports the development of all the SROs. Where practical, we have utilised regionally-led work, and in other areas we have formed “club” projects with other SRO teams, maximising expertise across companies.
- 9.12. A high-level summary of the gate two customer work is outlined in Figure 9-2, and full details are provided in Annex E2 (Stakeholder Engagement).

Figure 9-2: Gate two customer work

	WRSE Best Value	Club Project: Public Value	Club Project: Changing Water Sources
<b>What did it test?</b>	Over 300 household customers were engaged to explore their preferences regarding the best value criteria.	Over 5,900 household customers, and more than 550 non-household customers, were engaged to understand the added value our customers perceive is important as part of infrastructure development, their preference for that benefit, and how much they are prepared to pay for it.	96 customers (qualitatively, including product testing), 1,400 customers and 200 non-households customers (quantitatively) were engaged to understand views on changing their water source. This included the co-design and testing of a communications framework.
<b>Main conclusions</b>	Customers place more weight on the delivery of a secure supply of water, followed by the cost of environmental improvements, with resilience placed on the lower end of the scale.	In both the qualitative and quantitative work, environmental project additions were valued highly. There was high emotional resonance with the narrative of supporting wildlife/new wetlands/habitats, consistent across all participating customers. The top three most highly valued project additions by households near a canal were: <ul style="list-style-type: none"> <li>• “Specialist habitats created for wildlife” (average £2.96 annually).</li> <li>• “New wetland area” (average £2.88 annually).</li> <li>• “A quarter of employees are local” (average £2.76 annually).</li> </ul>	The “human” frame was deemed the best for overall communication. As this is a low-salience topic, a breadth of materials needs to be available to help inform customers.

- 9.13. The outputs of the customer work have fed directly back into the technical teams to help prioritise and develop the design of the scheme for gate three as it moves forward.
- 9.14. The key communications implications for the scheme moving forward are summarised in Figure 9-3.

Figure 9-3: Water transfer – Key implications for communications

WHO	WHAT	HOW	WHERE	WHEN
<p> Water companies are seen as a logical key messenger on this topic.</p>	<p> Provide a clear description of how the process works, in terms of the infrastructure required for transfers and when/how water is treated.</p> <p> Give reassurances on taste and quality, reiterating that customers will not experience a noticeable change.</p> <p> Address environmental concerns directly, reassuring of ways they can be addressed and managed.</p>	<p> Adopt a factual, 'business as usual' tone, to avoid raising any new concerns regarding the change.</p> <p> Avoid emphasising that water will be from a 'different' location, as this could drive concerns on taste and quality.</p>	<p> Keep initial contact concise, with shorter pieces of information working well for direct communications.</p> <p> Direct customers elsewhere for further, more detailed, additional information (e.g. weblink, contact numbers).</p> <p> Streamline communication, providing updates on source changes alongside other forms of direct contact to increase the opportunity of cutting through (e.g. emails, bills).</p>	<p> Little upfront communication is required, unless construction is required in local areas.</p>

## Challenging Our Approach

- 9.15. The process of delivering our customer engagement activity collaboratively has been driven through the WRSE Engagement and Communications Board (for regional work) and steering groups formed by the SRO companies for each project.
- 9.16. We have benefited from a wide range of expertise within the companies' insight, regulation and water resources teams to help design and develop the engagement activities. This helped ensure alignment with best practices and wider insight activities that inform PR24 business planning. All of the research was delivered by independent market research agencies compliant with the Market Research Society (MRS) code of conduct.
- 9.17. In addition, WRSE has facilitated a regional Customer Challenge Group (CCG), bringing representatives from the Consumer Council for Water (CCW) and the companies' independent challenge groups to share and input on the approaches and materials used to engage customers. We have also shared briefs and materials for the research with CCW and the DWI for comment, and have presented our findings to them through a number of webinars.

## 10. Board Statement and Assurance

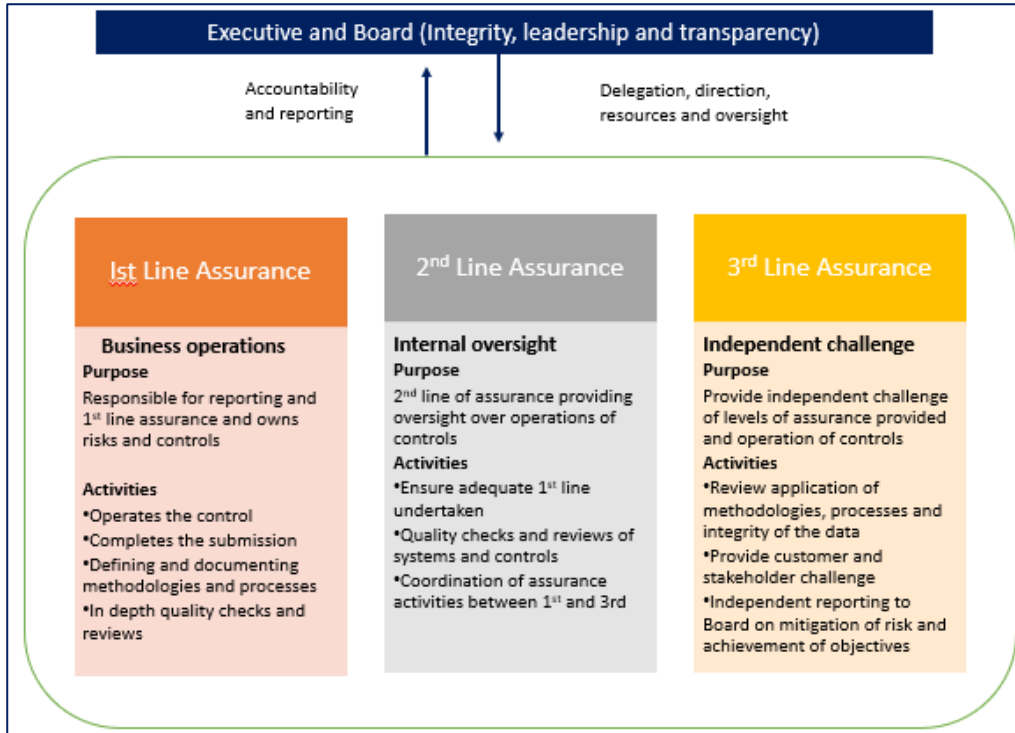
- 10.1. Board statements are provided in the covering letter to this gate two submission. The boards of STW, AfW and the Trust support our recommendation for progression of this SRO. The views of the boards are aligned, as evidenced by their respective statements.

### Assurance Approach

- 10.2. The assurance framework used for this submission has been developed jointly by STW and AfW.
- 10.3. The risk-based assurance approach is consistent with that documented in the individual companies' statements of reporting risks, strengths and weaknesses, and

our respective Business Plans for 2020 to 2025 (AfW: Appendix 11<sup>12</sup>; STW: Appendix A1<sup>13</sup>), and is based on a shared understanding of the “three lines of assurance” model shown in Figure 10-1. It is also consistent with the assurance requirements laid out in Ofwat’s Company Monitoring Framework<sup>14</sup>.

Figure 10-1: Risk assessment and assurance approach



- 10.4. This approach provides an effective programme of assurance which considers areas that we know are of prime importance to our customers and regulators, or may have a significant financial value, alongside the likelihood of reporting issues. Areas of higher risk receive three lines of assurance while other areas, where the risk is lower, receive first- and second-line assurance only.
- 10.5. Following a competitive tender, we appointed an external assurer. The third-line assurance statement confirms that the assurer is satisfied that, on the basis of the evidence presented and the limitations and scope of the assurance activities, the submission is suitable for progression through gate two. The board statement is supported by the assurance statement, and there are no outstanding material issues to be resolved prior to gate two submission. The company boards are satisfied that progress to date allows the scheme to be construction ready by AMP8. Our approach was augmented by experience that the companies gained through the PR19 assurance process and the sharing of best practice (e.g. use of the STW risk assessment framework).
- 10.6. We continually look to improve our assurance approach and will conduct a lessons-learned exercise before we finalise our assurance approach for gate three.

<sup>12</sup> AfW: <https://www.affinitywater.co.uk/docs/corporate/plans/appendix-11-governance-and-assurance.pdf>

<sup>13</sup> STW: [Risks, Strengths and Weaknesses in regulatory reporting and assurance plan](#); [2020-2025 Business Plan: Appendix A12](#)

<sup>14</sup> The latest iteration of the Company Monitoring Framework can be found on the Ofwat website: <http://www.ofwat.gov.uk/publication/company-monitoring-framework-final-position/>

## 11. Efficiency of Expenditure for Gate Two and Forecast

### Breakdown of Cost and Evidence of Efficiency

- 11.1. This chapter is a summary of Annex E4 (Efficiency of Spend), which provides the supporting information, data and analysis to confirm the efficiency of spend to RAPID for gate two expenditure. All costs in this chapter are deflated to FY2017/18 prices.
- 11.2. As shown in Table 11.1, the total gate two budget for GUC SRO is £3.32m.

Table 11.1: Gate two budget

Item	Affinity Water (£M)	Severn Trent (£M)	Total (£M)
Final Determination GUC SRO	9.00	9.00	18.00
Gate 2 budget (15%)	1.35	1.35	2.70
Gate 1 underspend (confirmed by email from RAPID on 05/01/22)			0.31
Early Gate 3 spend (confirmed by email from RAPID on 25/05/22)			0.31
<b>TOTAL Gate 2 budget</b>			<b>3.32</b>

- 11.3. The actual costs are recorded to the end of July 2022, based upon actual invoices received, plus additional forecast contracted costs to the gate two submission (14 November 2022). Table 11.2 provides the breakdown of the actual costs, showing the percentage of total spend per category/activity against the Ofwat Final Determination allowance. The contracted spend to gate two is £3.2m, and Table 11.2 shows a predicted underspend of approximately £86k.
- 11.4. The gate two EA Area costs and NAU budget is £179k. To the end of July 2022, £63k has been invoiced against this budget line, and it is unlikely that additional expenditure will reach the budget ceiling.
- 11.5. The early gate three spend budget estimate of £305k has not been spent in full.
- 11.6. The majority of the gate two work packages were procured in 2021 and early 2022, before the current period of high inflation. We expect that the impact of high inflation on gate two will therefore be minimal.
- 11.7. A reconciliation will be undertaken at the end of November 2022 to provide a final spend against budget.

Table 11.2: Gate two expenditure<sup>15,16,17</sup>

Category	Activity	Expenditure Activity (£)	% of Total Expenditure Activity	Expenditure Category (£)	% of Total Expenditure Category	Description
Programme and Project Management	PM & PMO	398,740	12.3%	437,120	13.5%	Project manager and project management office
	Assurance	38,380	1.2%			3rd line assurance and copywriting
Feasibility Assessment and Concept Design	Canal modelling	358,803	11.1%	858,404	26.6%	Hydraulic and water quality modelling
	Engineering	499,601	15.5%			Transfer, canal, abstraction and treatment design and reporting
Option benefits, development and appraisal	Non-water resource benefits	incl	0.0%	-	0.0%	Included in Engineering
	Carbon, wider best value & option appraisal	incl	0.0%			Included in Engineering
Environmental Assessment	Ecological monitoring	53,022	1.6%	604,313	18.7%	Ecological monitoring and reporting
	Ecological monitoring - Summer 22	51,127	1.6%			Ecological monitoring and reporting - early gate 3 spend
	Environmental Assessment	289,121	9.0%			Environmental monitoring and reporting
	National Assessment Unit (NAU) & Environment Agency (EA) Area costs	178,797	5.5%			Regulator requested budget for NAU and EA area costs
Data collection, sampling and pilot trials	Natural England	32,246	1.0%	930,915	28.8%	Regulator requested budget for Natural England
	Water Quality	734,892	22.8%			Sampling analysis and reporting
	Water Quality - Summer 22 monitoring	187,910	5.8%			Sampling analysis and reporting - early gate 3 spend
	Emerging substances monitoring	8,112	0.3%			Sampling analysis and reporting - early gate 3 spend
Procurement Strategy	Procurement strategy	132,049	4.1%	132,049	4.1%	Procurement options and reporting
	Planning and consent strategy	9,120	0.3%			DPC planning workshop and reporting
Planning Strategy	Land referencing, field surveys, permitting plans	incl	0.0%	9,120	0.3%	Included in Environmental Assessment and Engineering
	Customer Engagement	40,302	1.2%			Customer research, benefits & impact and reporting
Legal	Legal advice and collaborative agreement	9,591	0.3%	9,591	0.3%	Legal advice and legal agreement between water companies
Other	The Trust	187,001	5.8%	207,691	6.4%	3rd party cost
	Water Resources South East (WRSE) upload	20,690	0.6%			3rd party cost
<b>Total</b>		<b>3,229,506</b>	<b>100.0%</b>	<b>3,229,506</b>	<b>100%</b>	
Gate 2 Allowance	OFWAT PR19 final determination for gate 2	2,700,000		2,700,000		
Transfer from gate 1	Gate 1 underspend approved for gate 2 use	310,131		310,131		RAPID approval 05/01/22
Early gate 3 spend	Approved early gate 3 spend	305,000		305,000		RAPID approval 25/05/22
<b>Revised gate 2 allowance</b>		<b>3,315,131</b>		<b>3,315,131</b>		
Gate under / overspend		85,625		85,625		

<sup>15</sup> Workstreams include spend to deliver gate two outcomes, and spend where we have procured items in accordance with our gate three programme. Where the latter occurred, we ensured this was discussed with RAPID as acceptable prior to incurring expenditure.

<sup>16</sup> Differences in percentages in Activities are accounted for by rounding from Excel base numbers.

<sup>17</sup> Tripartite leadership costs (shown in Table 11.3) are apportioned across workstreams in Table 11.2 according to the Expenditure Activity percentage.

- 11.8. In delivering this submission, we have adhered to the criteria provided by RAPID for efficient expenditure, namely that activities should be relevant, timely, complete and of high quality, and that this should be backed by benchmarking and assurance. We believe our expenditure to gate two has been efficient, evidenced by the following:
- We have ensured that any monies spent (e.g. on surveys or resources) is focused and relevant for this stage of the project. Only the expenditure relevant to delivering work packages to produce the gate two submission have been included in our gate two budget, with the exception of early gate three expenditure agreed with RAPID.
  - Costs for procured services ensured efficient spend by following the prioritised hierarchy of standard procurement approaches, as set out in Annex E4 (Efficiency of Gate Two Spend).
  - Costs for procured services have been benchmarked where possible, and care has been taken to ensure efficient spend on agreed, appropriate activities to advance the development of this project through gate two.
  - Working with three partner companies has necessitated a greater level of effort compared to other SROs to ensure effective lines of communication, decision-making and governance. A core programme team of representatives of the companies, supported by a competitively procured, independent programme manager, has been established to manage this process effectively. The three partners have been working to develop this solution collaboratively; however, implementation of this solution, from a planning and procurement perspective, will require more formal relationships to be adopted from gate three onwards.
  - BAU costs have been explicitly excluded from gate two costs for the SRO, stakeholders and technical consultants. Only the expenditure relevant to delivering work packages to produce the gate two paper have been included in our gate two budget.
  - We have driven efficiencies through the utilisation of the core programme team, supported by technical experts procured through the existing framework agreements across the companies, as shown in Table 11.3.
  - It was not possible to competitively tender all work elements:
    - For example, work undertaken by the three companies and the costs of regulators such as the EA/NAU, NE and WRSE could not be tendered. 27% of the gate two costs could not be competitively tendered.
    - Of the remaining 73% of gate two costs that could be competitively tendered, 59% of work packages were let specifically for gate two via company frameworks, 3.1% were gate two work package extensions, 10.4% were competitively tendered via company frameworks at gate one and extended for gate two, and the remaining 0.3% were direct awards. Company frameworks were competitively tendered, with prices externally benchmarked to ensure value for money for our customers. This has maximised cost savings for specific technical disciplines, and has avoided duplication of activities and/or resources across the three companies.
  - We have delivered economies of scale by partnering with other organisations to procure packages of work with common scope and objectives. Examples include tendering work packages for delivery across multiple SROs, such as the assurance work package delivered by Stantec and procured for GUC, Minworth and STS SROs.

We have also engaged with the ACWG to partially fund consistency projects such as the customer engagement work package.

- As an SRO, we have reviewed existing data sources and undertaken gap analysis to ensure we have not duplicated existing research, and have instructed our partners to do the same.
- There were no activities in the planned expenditure to gate two that were not carried out.
- There were several packages of work undertaken in the gate two period that were not anticipated in gate one, including the emerging substances review and longer periods of ecological and environmental monitoring over Summer 2022. Some elements of these additional work packages were delivered under the gate two budget, and early gate three funding was requested for other elements.

Table 11.3: Summary of spend by procurement method

Award Type	Totals by Award type (£, 2017-2018 prices)	% of total spend	% eligible external spend
Extension to Framework Mini-bid procured at gate 1	334,999	10.4%	14.2%
Framework Mini-bid procured at gate 2	1,918,169	59.4%	81.1%
Extension to Framework Mini-bid procured at gate 2	101,361	3.1%	4.3%
Direct Award	10,690	0.3%	0.5%
3rd Party	367,236	11.4%	n/a
Tripartite leadership costs	497,052	15.4%	n/a
<b>Total</b>	<b>3,229,506</b>	<b>100%</b>	<b>100%</b>

## Forecast Spend to Gate Three

- 11.9. RAPID’s gate three guidance (August 2022) confirms that allowances for gates three and four will be merged, and that the level of expenditure at each gate will not be assessed. We will propose, for agreement with RAPID, a list of development activities for gate three along with expenditure estimates. As noted in the guidance, the gates three and four allowances do not include funding for land acquisition, and this element is not included in the SRO’s forecast spend.
- 11.10. As shown in Tables 11.4 and 11.5, the total budget for GUC SRO gates three and four is £13.3m.

Table 11.4: Gates three and four budget

Item	Affinity Water (£M)	Severn Trent (£M)	Total (£M)
Final Determination GUC SRO	9.00	9.00	18.00
Gates 3 & 4 budget (75%)	6.75	6.75	13.50
Early Gate 3 spend utilised in Gate 2 period			-0.31
Gate 2 underspend (confirmed by email from RAPID on 28/09/22)			0.09
<b>TOTAL Gates 3 and 4 budget</b>			<b>13.28</b>

- 11.11. We have developed a gate three budget through engagement with workstream leads and external stakeholders including EA (via the NAU), NE, DWI and RAPID. We have referenced the gate three requirements published in the Final Determination and RAPID gate three guidance, and mapped activities and deliverables to achieve those



outcomes. Our forecast spend for gate three is provided in Table 11.5. It should be noted that this is a forecast and is based upon a number of assumptions, dependencies and risks, including the potential impact of inflation, which will be refined as we progress to procurement of work packages.

Table 11.5: Forecast spend to gate three<sup>18</sup>

Category	Activity	Expenditure Activity (£, 2017-2018 prices)	Expenditure Category (£, 2017-2018 prices)	% of Total Expenditure Category
Programme and Project Management	PM & PMO	500,000	660,000	8.0%
	Assurance	160,000		
Feasibility Assessment and Concept Design	Detailed surveys (topo, geo & contam land)	470,000	2,980,000	36.1%
	Solution Design & support data	1,840,000		
	Modelling	650,000		
	CDM	20,000		
Option benefits, development and appraisal	Incl		0	0.0%
Environmental Assessment	Planning (EIA co-ordinator/ planning advisor)	630,000	930,000	11.3%
	NAU & EA Area costs	300,000		
Data collection, sampling and pilot trials	Continued environmental monitoring	420,000	3,010,000	36.5%
	Targeted ecological surveys for EIA	1,200,000		
	Continued WQ monitoring and lab analysis	1,360,000		
	Drinking water safety plan update	30,000		
Procurement Strategy	Procurement and Funding strategy	40,000	40,000	0.5%
	Engineering procurement	0		
Planning Strategy	Land referencing	80,000	80,000	1.0%
	Land Acquisition	0		
	Planning/ consents fees	0		
	Planning performance agreement	0		
Stakeholder engagement	Support to planning work	40,000	40,000	0.5%
Legal	Commercial & legal advice	220,000	220,000	2.7%
Other	The Trust	280,000	290,000	3.5%
	WRSE regional planning	10,000		
<b>Total</b>		<b>8,250,000</b>	<b>8,250,000</b>	<b>100%</b>
Gate 3 and Gate 4 Allowance	OFWAT PR19 final determination for Gates 3 & 4	13,500,000	13,500,000	
Transfer from previous gate	RAPID approval 25/05/22		- 305,000	
Underspend from Gate 2	RAPID email 28/09/22		85,625	
<b>Revised Gates 3 and 4 allowance</b>			<b>13,280,625</b>	
Remaining Budget			5,030,625	

## Assurance of Current and Forecast Spend

11.12. We can confirm that our gate two expenditure and forecast gate three expenditure has been assured by our external assurance providers (see Annex E3 Assurance Report and Board Statement).

## 12. Conclusions and Recommendations

### Conclusions

- 12.1. This is one of the more complex SROs, both operationally and in terms of procurement, due to the use of existing assets that are owned by the Trust, and the multiple companies involved. The SRO partners have worked collaboratively to prepare this gate two submission, and to present a viable solution to be carried forward to the DCO pre-application stage.
- 12.2. GUC SRO offers drought resilience by utilising treated wastewater from Minworth WwTW, and also provides an alternative water supply in the event of an incident affecting supplies from the River Thames.

<sup>18</sup> Differences in percentages in Activities are accounted for by rounding from Excel base numbers

- 12.3. The project plan for GUC SRO is based upon scheme selection in the Regional Plan. In accordance with the draft WRSE Regional Plan published in Autumn 2022, a scheme DO of 50 Ml/d is required in 2031/32, with a potential requirement for a further 50 Ml/d by 2040 to 2050.
- 12.4. A scheme with a DO exceeding 80 Ml/d is defined as a NSIP, and requires a DCO to authorise its construction and operation. The DCO consenting route includes statutory timeframes for decisions, and therefore offers the greatest prospect of timely project delivery.
- 12.5. Based on the conclusions of the DPC eligibility assessment, three works packages have been identified: the transfer to the canal at Atherstone will be implemented by STW under PR24, along with work at Minworth WwTW required under Minworth SRO. A CAP will undertake the works at the site for abstraction and treatment, and the transfer to the AfW network. The CAP may also be best placed to be responsible for construction work on the canal, with the work being undertaken by its own contractors or by the Trust under a sub-contract agreement. The Trust will be required to operate completed works on the canal, in order to meet its obligation to all users of the canal network. We will continue to develop the optimum procurement plan in gate three. The GUC is on schedule to be construction ready by AMP8, as per the Final Determination requirement.
- 12.6. Scheme utilisation is heavily focused on summer and is expected to be around 80% during dry-year demand events, increasing beyond this only during significant droughts (>1 in 50 years). From October to April, the scheme is expected to operate at 25% utilisation, with flows ramping up to 55% in May and 80% from June to August, and reducing down to 55% in September.
- 12.7. No significant adverse effects on designated SACs, SPAs and Ramsar sites are foreseen, due to the lack of pathways between the GUC SRO and protected sites.
- 12.8. There are opportunities at many locations along the canal to provide wider benefits to the environment, local communities and canal users. Advantage could be taken of remediation and upgrading work along the route to improve interaction between the canal and adjacent rivers, alleviating flooding, introducing rare plants and creating public footpaths.

## Recommendations

- 12.9. Through gate two, we have not discovered any showstoppers or issues that threaten the validity of the scheme, and therefore recommend this SRO proceeds to gate three.
- 12.10. The boards of the SRO partners support the recommendation for solution progression made in this submission.
- 12.11. We propose that gate three will focus on the pre-application phase of the DCO process. We will complete statutory consultation and engagement, and develop the scheme design and preliminary environmental information in line with DCO requirements for this stage.

Table 12.1: Resolution of risks and barriers

No.	Risk	Resolution
1	There is uncertainty around setting the requirement for the level of treatment to water from Minworth WwTW into the canal, with resulting cost uncertainty.	This is a Minworth SRO risk, and is discussed in detail in the Minworth SRO gate two submission. Minworth SRO is working closely with the EA for understanding and resolution of this uncertainty. Through regional modelling, it has been established that the GUC SRO is still being selected at higher treatment costs.
2	There is potential for increased movement of INNS from the north section of canal, due to increased flow.	We are monitoring to understand the current prevalence of INNS, and carrying out pathway-based risk assessment, the findings from this work will be used to propose ways of reducing the potential for INNS movement.
3	There is potential for increased flows in the GUC to cause mobilisation and transport of sediment from the base of the canal.	Investigations conclude consolidated bed sediment will not be mobilised. We will carry out further investigation in gate three into the chemical content of weak uppermost deposits and their potential for mobilisation.
4	Engagement with NE, a key stakeholder, has been reduced due their resourced limitations.	We are working closely with the NAU to escalate this for resolution.
5	There is a risk that the Regional Plans will not align, and that a difference will exist in the selection of SROs.	We actively engage at monthly water regional group meetings, to better understand the regional reconciliation process and how the Regional Plans will link together. We will continue to engage with the regional groups between the draft and final iterations of their Regional Plans.

## 13. Supporting Documentation

13.1. Table 13.1 provides the list of annexes that accompany this gate two submission. Where annex numbering is not concurrent, this indicates amalgamation of deliverables into fewer documents as the gate has progressed than anticipated at the outset.

Table 13.1: List of GUC SRO Annexes

<b>A</b>	<b>Engineering</b>	B3.2.5	Sediment Sampling and Analysis
<b>A</b>	<b>Integrated Design Schedule</b>	B3.2.6	Habitats and Protected Species
<b>A1</b>	<b>Engineering Conceptual Design Report (CDR)</b>	B3.3.1	Strategic Environmental Assessment
A1	Engineering CDR	B3.3.2	Natural Capital and Biodiversity Net Gain
A1.1	Abstraction Site Selection	B3.3.3	Habitats Regulations Assessment
A1.2	Transfer Route Selection	B3.3.4	Water Framework Directive
A1.11	Costs and Carbon Assessment	B3.3.5	Environmental Appraisal Report
<b>A2</b>	<b>Modelling CDR</b>	<b>E</b>	<b>Non-Technical Annexes</b>
A2.1	Hydrology and Aquator Validation Report	<b>E1</b>	<b>Procurement Strategy</b>
A2.2	Hydraulic Model Upgrade Appendix A (separate Excel document)	E1	Procurement Strategy
A2.3	Phases 3 & 4 Water Quality Modelling	<b>E2</b>	<b>Stakeholder Engagement</b>
A2.3.1	Phase 1 Water Quality Modelling Updates	E2.1	Stakeholder Engagement
A2.4	Final Modelling Report	E2.2	Water Club Changes of Source
<b>B</b>	<b>Environmental Assessment</b>	E2.3	Customer Preferences on Added Value for Large Resource Schemes
<b>B1</b>	<b>Water Quality Monitoring</b>	E2.4	Best Value Criteria – Customer Research
B1.4	Water Quality Monitoring Appendix E (separate Excel document) Appendix F (separate Excel document)	<b>E3</b>	<b>Assurance Report</b>
B1.5	Water Quality Risk Assessment WQRA (separate Excel document)	E3	Assurance Report
B1.6	Emerging Substances Emerging Substances spreadsheet (separate Excel document)	<b>E4</b>	<b>Efficiency of Gate Two Spend</b>
<b>B2</b>	<b>Ecological Monitoring</b>	E4	Efficiency of Gate Two Spend
B2	Ecological Monitoring	<b>E5</b>	<b>Project Plan</b>
<b>B3</b>	<b>Environmental Assessment</b>	E5	Project Plan Report
B3.1	Environmental Assessment Sampling Methodology	<b>E6</b>	<b>Gate One Decision – Actions and Recommendations</b>
B3.2.1	Watercourse Connections	E6	Gate One Decision – Actions and Recommendations
B3.2.2	Fish Assessment	<b>E7</b>	<b>Cost Profile – WRMP Table 5</b>
B3.2.4	INNS Risk Assessment	E7	Cost Profile – WRMP Table 5
		<b>E8</b>	<b>Design Principles</b>
		E8	Design Principles